The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XIII. No. 337 NOVEMBER 28, 1925 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.6.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4.*

Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines).

Tar Products

IF stock is taken of the raw materials in which the products of the organic chemical industry have their origin it will be found that coal tar easily takes the first place. It may almost be said that coal tar products defy classification; their number is being constantly added to, and improvement in the methods of their preparation has gone hand in hand with the increase in the demand for them. It is unnecessary to elaborate the part that coal tar and its dependent industries play in our economic and industrial life, or their contribution to our national prosperity; but it is worth while putting on record that the position in which the industry finds itself to-day must be largely attributed to research and thereby constitutes one of the most emphatic justifications for research that could be wished for. When consideration is given to the history of coal tar chemistry and to the treasures which it has already yielded up, no doubt can remain that even greater and more extended applications will be found for these products in the future. As a source of pure chemicals with great potential uses, coal tar is still largely unworked, and progress from the industrial standpoint is hampered in the case of some products by the fact that, although such products may be easily and cheaply prepared, it remains to be determined for exactly what purpose they are useful, and thereby to create a demand which will ensure their manufacture being profitable. Even at the present time it is possible to point to many processes which have been worked out successfully on a laboratory scale, but which are faced not with technical obstructions but merely commercial ones. Science, in fact, has run ahead of industry, but problems such as this can well be left to work themselves out in the near future.

The rapid advances that have been made in coal-tar distillation processes are indicated by the comprehensive survey of modern types of plant that Mr. H. M. Spiers contributes to this issue, which is largely devoted to tar products. The numerous industries dependent on coal tar and the many products obtained from it are outlined in another page by a tar-works manager. The use of tar in road dressing is also discussed in the report of a paper read at the Congress held in conjunction with the Public Works, Road and Transport Exhibition.

Although coal tar has been used for this purpose for over 50 years, the history of wood tar dates back at least ten times this period, the process of wood distillation having been carried on for several centuries. An early research shows that English seamen first exploited wood-tar products in the sixteenth century, as Mr. Danishewsky shows in his interesting article on this industry, in which he also describes the types of distillation plant employed in the Russian wood regions. Wood tar and pitch still have a wide application in the manufacture of varnish and other products, as well as in the treatment of ropes, tarpaulin and sails. Tar products, mineral and vegetable, are playing an ever-increasing part in industry and a yet wider field for their application is confidently to be anticipated.

Nitrogen from the Air

THE rate of progress and expansion in the Billingham-on-Tees plant for the production of synthetic ammonia is convincingly illustrated in the order which Synthetic Ammonia and Nitrates, Ltd., have just placed with a northern ironworks for a number of very large forged ingot steel towers. The order is of the value of about £100,000, and some fifteen to eighteen months will be required to execute it. When the company recently issued £2,000,000 5 per cent. guaranteed debenture stock (guaranteed by the Government under the provisions of the Trade Facilities Act), it was estimated that the extensions in contemplation would ultimately ensure an output of 200 tons of pure ammonia per day, equal to an annual production of 270,000 tons of

sulphate of ammonia. It was also stated that the net proceeds of the issue would be expended in Great Britain either directly on labour or in the purchase of material and goods manufactured and produced in Great Britain. It is in accord with the Brunner, Mond and Co. tradition that undertakings of this kind should be strictly carried out, and we have no doubt that the expectations held out will be fully realised in the near future. When one recalls how short a period it is since this country was entirely without facilities for the fixation of atmospheric nitrogen and contrasts the situation then with the position and prospects of the industry to-day, it will be realised what astonishing advances have been made. It is a matter of both pride and confidence that the nation should have within its resources a scientific, technological, and commercial organisation capable of such an achievement.

With this announcement may be associated another that comes from the United States. The Du Pont Co., which some time ago acquired the American rights in the Claude synthetic ammonia process, recently formed Lazote, Inc., as a subsidiary company to develop that process, and at Belle, West Virginia, a plant capable of an output of approximately 25 tons per day of anhydrous ammonia is being erected. This is expected to be ready for operation by February of next year. The scheme includes a water gas plant with a capacity of 8,000,000 cubic feet per day. This will differ from the ordinary water gas plant in the fact that the gas will not be carburetted, and that bituminous coal will be used as fuel instead of coke or anthracite coal. It will be the largest gas plant in the United States burning bituminous coal. The characteristic features of the Claude process have frequently been described in our columns, but it may be added that the pressure to which the combined hydrogen and nitrogen gases are to be subjected is about 1,000 atmospheres, and the temperature about 1,000° F. As is general in the United States the product will be marketed as pure anhydrous ammonia.

B.D.C. Scheme Carried

AFTER a very full statement of the position by the chairman (Lord Ashfield) and the not very serious factional opposition that might have been expected, the scheme for the reconstruction of the British Dyestuffs Corporation was adopted at a general meeting of the shareholders in Manchester on Wednesday. It would have been remarkable, indeed, if the shareholders who really desire to see the Corporation a financially prosperous concern had taken any other view. For the capital of the company is at one step brought down from an impossible figure to a workable sum, and the concern is freed from that very doubtful blessing—State patronage and State control.

It is to this last feature in the scheme that public criticism is most likely to be directed, since the abolition of the Government veto will leave the Corporation free to enter into any home or foreign trade alliances it desires. The conclusive answer to the objections that are sure to be raised on this point is that the Corporation in the new conditions merely enjoys the rights that every other dyestuff or other private trading concern in the country enjoys—and nothing more. That British companies should not be allowed this liberty but should be subject to a Government veto in relation to foreign relations might be an arguable case for those to put up who desire to restrict all forms of private enterprise. But such a restriction should apply to all or to none. There is no logical ground for applying to the largest British dyestuffs concern restrictions from which smaller competing firms are entirely free and which apply to none of the other basic industries of the country. The Government, it may be said, invested £1,700,000, and is surrendering that interest for £600,000. It is very much in the position of the private investor in that respect. The essential end for which the Government supplied the money was to establish a British dyestuffs industry. And in the short period of ten years that has been done. It is not an exorbitant price to pay for so important a national result.

There is, of course, a natural concern for the maintenance of the industry, involving the existence of a national school of organic chemistry, an assured supply of colours, and certain guarantees for national safety in time of war. It is hardly likely that the shareholders will be more indifferent to this than the public. Certainly, in the present general manager there is to be found as high a regard for the reputation of British chemistry as any to be found among critics, and an equal incentive to efficient production and good commercial organisation. Lord Ashfield in his closing words had, no doubt, this matter in mind when he gave a definite assurance that the Corporation would not be allowed to sink or drift into the position of a mere distributing agency for dyestuffs, and that whatever agreement might be made, it would not be inimical to the interests of their customers, the colour users, but would be made with the object of securing for them the widest measure of freedom in the conduct of their business and the opportunity, as far as possible, to purchase their colours at the world's prices. "The Corporation," he said, "will continue to be in the future what it has been in the past—a large manufacturing company whose aim will be to meet, so far as its resources will allow and upon an ever-widening scale, the needs of the colour users of this country, and employing a large staff of skilled chemists that will continue to be an undoubted asset to our country in times of peace as well as of war."

Alcohol from Beet

A PAMPHLET which has just been issued by the British Power Alcohol Association strikes quite a hopeful note as regards the possibilities of producing power alcohol from beet on a comparatively large scale in this country. A contrast is drawn between the cultivation of beet for sugar purposes and for alcohol production, and it is contended that while in England there are many localities where beet can be grown profitably, it cannot be produced in sufficient quantities to support a sugar factory on an economic basis unless some 40,000 acres of land are available. On the other hand, a distillery can be operated profitably by treating only 25 per cent. of the quantity of beet which must be dealt with in order to make sugar production profitable, and again, unlike sugar factories, which depend upon the beet season, the distilleries could work throughout the whole

year. That is to say, as soon as the beet season is over they can turn to other raw materials such as surplus potatoes, damaged grain and molasses, cassava, or other Empire products. This consideration is, of course, of the greatest importance, for it would effect a large reduction in overhead charges and thereby ensure substantially lower production costs.

It is just a year since a deputation representing all the interests concerned visited the Minister of Agriculture and asked for a subsidy for the erection of beet-alcohol plants, as was granted in the case of beet sugar. The suggestion was that the Government should subsidise the industry for the first three years on a production basis of three million gallons per annum, but nothing has yet materialised. The British Power Alcohol Association now states that it is convinced that the possibility of the self-maintenance of the distilleries at the end of the subsidy period has been reasonably established. It now rests with the Government to take the very modest step demanded, which may well lead to the establishment of a great industry and the much-needed extension of cultivation of arable land in this country.

Developing Sulphate Markets

MR. MILNE WATSON'S very thorough review of the sulphate of ammonia market, at the annual meeting of the Federation, added several new points to those mentioned in the already published annual report of the Federation. It is clear that, with the almost certain prospect of lower prices, producers must look for compensation in increased consumption. The opportunities for increased use in undeveloped tropical countries are almost without limit, and the propaganda work of the Federation is largely directed to them. Mr. Watson showed also that at home the limit of useful application of sulphate is very far from having been reached. The case of grass land illustrates the point in the most convincing way. It is obvious, however, that for this essential propaganda work at home and abroad a very large central organisation is required. The Federation has already rendered invaluable service to the industry by its action in regard to prices and in opening new and developing existing markets, and it is satisfactory to find that it continues to command the support of the great majority of producers.

Anti-freeze for Automobiles

CHEMISTRY has developed an anti-freeze for automobiles which meets the ideal requirements laid down by the United States Bureau of Standards. So, at least, the American Chemical Society is informed by Dr. C. O. Curme, of the research laboratories of the Carbide and Carbon Chemicals Corporation. The compound is ethylene glycol, in which the properties of alcohol and glycerine are combined. Previously, alcohol has been used. The advantage of the new anti-freeze, it is claimed, is that, unlike alcohol, it will not boil away, and that it can be left in a motor car summer and winter without fear of loss or damage. To safeguard the large investment represented by the various classes of automobiles and to protect the interest of owners, the Bureau of Standards took up the study of anti-freeze solutions, and announced the following specifications for an ideal product: "The material shall prevent freezing of the radiator liquid without injuring either engine or radiator; shall not lose its non-freezing properties during and after continued use; shall not materially change the boiling point of water when dissolved in it." These tests, it is claimed, have been met. It is further suggested that another specification, which ethylene glycol is said to meet, should be added to those of the Bureau, namely, "The material should not attack automobile finishes; it should be odourless; it should be non-inflammable; its water solutions should have a low viscosity: its water solutions should have high heat capacity."

Books Received

THE CHEMICAL ANALYSIS OF FOODS. By Dr. H. E. COX. London: J. and A. Churchill. Pp. 323. 18s.

REPRINTS FROM THE SMITHSONIAN INSTITUTE, REPORT FOR 1924, Washington, U.S.A.

"The Physicist's Present Conception of an Atom." By R. A. Millikan. Pp. 187–192.

"The Vacuum—There's Something in It." By Dr W. R. Whitney. Pp. 193–206.

"Clear Fused Quartz Made in the Electric Furnace." By Edward R. Berry. Pp. 213–218.

"The Electrical Structure of Matter." By Professor Sir Ernest Rutherford. Pp. 161-185.

A TEXT-BOOK OF ORGANIC CHEMISTRY. By Dr. A. F. Holleman. New York: John Wiley & Sons, Inc. London: Chapman and Hall, Ltd. Pp. 581. 17s. 6d.

SECOND YEAR COLLEGE CHEMISTRY. By William H. Chapin. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. 354. 15s.

The Calendar

1925 Nov. 23 to Dec. 5	Shipping, Engineering, and Machinery Exhibition	Olympia, London.
Nov. 30	Royal Society of Arts (Cantor Lecture): "Coal Ash and Clean Coal" (Lecture II). Dr. Lessing. 8 p.m.	John Street, Adelphi, London, W.C.2.
30	Birmingham University Chemical Society: "Corrosion," J. P. Baxter.	University, Birmingham.
Dec. 1	Society of Chemical Industry (South Wales Section): "Manufacture and Neutralisation of Ammonium Sulphate." C. Bateman.	Technical College, Cathays Park, Cardiff.
1	Institute of Metals (Birmingham Section): Discussion on the Production of Sound Ingots.	Chamber of Commerce, New Street, Birmingham.
1	Institute of Metals (N.E. Coast Section): "The Solidification of Metals." Dr. Maurice Cook.	Armstrong College, Newcastle-on-Tyne.
2	Society of Public Analysts: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London.
3	Institute of Chemistry (Bristol and S.W. Section) and Society of Chemical Industry.	Chemical Department Bristol University.
3	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London.
3	Finsbury Technical College: Streatfeild Memorial Lecture, "The Scientific Basis of Industry." Francis H. Carr. 4 p.m.	Leonard Street, City Road, London, E.C.2.
4	Society of Chemical Industry (Manchester Section): "The Separation of Crocein Acids and their Arylamine Salts." C. M. Keyworth and Dr. R. B. Forster. 7 p.m.	16, St. Mary's Parsonage, Manchester.
7	Royal Society of Arts (Cantor Lecture): "Coal Ash and Clean Coal" (Lecture III). Dr. R. Lessing.	John Street, Adelphi, London, W.C.2.
7	Institute of Chemistry (Manchester Section): Social Evening.	
8	Institution of Petroleum Technologists: "Oil Well Tool Steel." P. N. Rogers.	Aldine House, Bedford Street, Strand, London.

Coal Tar and Its Place in Industry

By a Tar Works Manager

As a raw material of the chemical industry, coal tar stands second to none in importance, and in the following article the author reviews the present position of this essential product and discusses the probable future developments in the wider utilisation of its primary constituents.

In compiling a general survey of the tar industry in Great Britain it is inevitable that the various classes of tar obtained by modifications in the process of coal carbonisation must occupy the centre of the stage. Reference to official statistics shows that of the total quantity of tar produced annually in this country no less than an average of 98 per cent. is derived from gasworks and coke-oven undertakings, although the figures relating to the former establishments include a small proportion of oil gas tars resulting from the manufacture of carburetted water gas. The tar industry, nominally speaking, implies, therefore, the production of the original raw material from coal, and mainly bituminous coal, together with the separation of the more common primary fractions. We are concerned, consequently, with the producer and the tar distiller, the rather more remote synthetic products now being regarded as falling into the province of the fine chemical manufacturer.

In considering the scope of the coal tar industry and the opportunities presented for future development, one all-important point must be kept in mind, namely, that coal tar is produced, not as a primary product, but as a residual in the manufacture of towns' gas and metallurgical coke. The output of coal tar is, accordingly, dependent entirely upon the prevailing demand for coal gas and metallurgical coke, and while the demand for coal gas is not particularly affected by the state of trade, the outlet for metallurgical coke must necessarily vary with the condition and development of our metallurgical industries. It was Professor Alexander Findlay who, in considering the important incidence of other industries on the supply of coal tar, remarked that a proper balance between output of, and the profitable outlet for, the different products and by-products of the distillation of coal must be established; and the whole series of interdependent and interlocking chemical industries must be carefully organised and developed so as to ensure the greatest efficiency and best utilisation of all products. The question of coal tar and coal tar products is, undoubtedly, one of great complexity as it is also one of great economic importance; and it must be treated as part and parcel of the much larger question of the most effective utilisation of our national reserves of coal.

Growth of the Industry

The coal tar industry is essentially of British origin, and it is not, perhaps, generally realised that in the early days of its development there was more coal tar distilled in Great Britain than in the rest of Europe combined. In the separation and preparation of the primary and more easily isolated fractions and substances this country has continued all along to play a leading rôle. The establishment of a complete coal tar industry, however, demands a far more intensive effort, and before the beginning of the past decade there was a consistent lack of enterprise and scientific application, the serious consequences of which were not appreciated until we were faced with a cessation of the supplies of everyday products which were found to be indispensable.

At the commencement of the present century, the approximate annual production of coal tar throughout the world was 2,700,000 tons, of which quantity the United Kingdom contributed about one-third and Germany one-fifth. Intensive efforts were, however, exerted by Germany in order to overcome her dependence upon us for a considerable proportion of the raw material required to feed the great dye and associated industries which she had built up. The enormous growth of the German iron and steel industries eventually enabled that country to render itself independent of other than native supplies of tar, and while in 1901 Germany's production of crude tar was rather less than 600,000 tons, by 1908 the output had been enhanced to a million tons, and to-day it is equal to, if not greater than, our own.

As regards the magnitude of the tar industry in this country it is instructive to bear in mind that the gas industry in itself now carbonises some 17 million tons of coal per annum, and that the production of tar from this important source is likely to continue is well illustrated by the figures recently given in evidence before the Coal Commission by Mr. D. Milne Watson.

Coal Commission Statistics

These figures, which show at a glance the increase in the amount of coal carbonised during the past twenty odd years, are given below, and in an additional column the writer has added the approximate yield of tar which resulted from this particular source.

Year.	Coal carbonised. *Tons.*	Tar produced. *Gallons.*
1903	13,916,203	135,000,000
1913	16,640,772	165,000,000
1923	16,460,632	160,000,000
1924	17,329,180	170,000,000

These figures in themselves are an emphatic reminder of the importance of the industry, but even they tell only a portion of the story. The coke-oven industry in this country, owing to the gradual transition from the old wasteful bee-hive oven to the highly efficient modern form of by-product coking oven has become an increasingly important factor in augmenting the total output of coal tar. It is necessary, again, to quote figures in order to emphasise the important part which the tar industry plays in the trade of the country as a whole. For some few years now the Chief Inspector under the Alkali Acts has adopted the admirable practice of including in his annual report a set of figures which show clearly, not so much the state of the tar producing industries, but the conditions prevailing in those industries which are dependent upon the distillation of tar. These figures, for the past five years, are given below:—

Amount of Tar Distilled (England and Wales).

Year.	Gas and Coke-Oven Works. *Tons.*	Other Works. *Tons.*
1920	1,450,535	117,788
1921	1,013,245	40,008
1922	1,176,610	9,384
1923	1,436,305	20,895
1924	1,582,784	12,219

The significant fact brought out by these statistics is that not only is the crude tar production increasing (as pointed out above) but the past four years have seen an appreciable and healthy advance in the quantity of tar actually treated by the distiller.

The Future

When we consider the immense strides that are taking place year by year in the coal carbonising industries in this and all other countries it becomes immediately apparent that unless the markets for subsidiary products are to be flooded, with a consequent all-round drop in values, something must be done to develop the applications of the more important by-products which are derived from coal. Of these products primary tar is amongst the most important, and by far the largest proportion of it is still used for covering our roads. The question of the production and utilisation of coal tar products is one indeed of immense economic importance, and it is rendered very much more complex by the fact that there is practically no industry which does not form an outlet for some or other of these products. As a raw material of the chemical industry coal tar, in fact, stands second to none in importance, and has largely been responsible for the revolutionary progress of the organic chemical industry during the present century. From purely an industrial point of view, however, the various crude primary products obtained from tar are of immense importance, and such substances as benzol, toluol, solvent naphtha, creosote anthracene, and pitch are household words in the vocabulary of the chemical merchant. There is a growing tendency nowadays towards the wider utilisation of these primary

constituents of tar, and though the problems connected with development along these lines are by no means easy of solution, they admittedly open up a wide and promising vista for research, only a comparatively small part of which has thus far been investigated.

But what of the various dependent industries? The various processes and trades which rely on the continuity of the supply of coal tar are far too numerous to mention here. But in the way of developing utilisation there is untold promise in the direction of liquid fuels and solvents, dyestuffs, drugs, and antiseptics, explosives, synthetic resins, synthetic tannins, and rubber accelerators. Some of the industrial uses of coal tar products which have not as yet been in any great evidence in the commercial and technical eye open up even greater possibilities than those which experience has rendered more familiar. As an example, one may mention such substances as tetralin and decalin, and the undoubted future which lies in front of hydrogenated compounds. In conclusion, it is scarcely necessary to emphasise the fact that not only are the resources of coal tar immeasurably far from being exhausted, but there is quite a host of compounds which have been isolated and for which no commercial application has as yet been found. Research chemists in all countries are, however, continually paving the way towards the development of both products and applications, and there can be but little doubt that, by carrying this great industry a stage further in all of its many ramifications, new markets will come of themselves and automatically increase in value and encouragement to those more enterprising manufacturers who are prepared to take advantage of them.

Wood Tar Products and Dry Distillation of Wood

By Israel Danischewsky

This article deals with the destructive distillation of resinous pine wood roots and stumps, and the types of plant used for that purpose. The author, who is chairman of the White Sea and Baltic Co., London, with associated concerns in Danzig, Bergen, Hamburg and New York, also gives the early history of the wood distillation industry, which was first developed in Russia.

THE burning of tar and boiling of pitch are associated with one of the very oldest industries, Russia claiming to be the pioneering country in the production of wood tar and pitch for trade purposes.

Early History

A great trade development between Russia and England began soon after the first visit to Russia of Richard Chaucellor, the English sailor, who went to the mouth of the River Dwina, where Archangel is now situated, in 1554. Amongst the first shipments from the White Sea to England were tar, pitch, and flax, and the Muscovy Co., organised in 1554, was the principal agent in the accumulation of Russian naval stores in England. The production of tar and pitch spread from the North of Russia to her neighbouring countries, Norway, Sweden, and Finland, where the industry developed to a great extent. In 1648 the Swedish Tar Industries Co. was formed, and for a number of years enjoyed a virtual monopoly in the world production of tar and pitch, spreading its activities throughout the north of Russia.

According to Mr. Thomas Gamble, in his *Early History of the Naval Stores Industry in North America* (published in 1921), Virginia took up the production of tar because England was not satisfied with her trade in Russia, owing to the many obstructive influences, and to the disadvantages of navigation in the Northern waters, caused by ice, and also on account of the competition of the Dutch, who had at that time enlarged their volume of trade with Russia. England, therefore, decided to patronise the development of the tar industry in America. In 1608 eight Dutchmen and Poles were sent to Virginia in order to assist in the manufacture of pitch, tar, glass, soap, etc., and in the same year, Captain Newport returned to England, and brought over a cargo of these commodities. These were the first naval stores shipped to England from what is now the United States of America.

The production of tar and pitch was a big factor in the development of the world's trade and industry in the past, when all means of communication, whether by road or water, were dependent to a great extent on tar production. Before the introduction of mineral oils nto the market, wood tar was used for greasing the axles of wheels, while tar and pitch were indispensable in the building of wooden boats and sailing ships. Ropes, fishing nets, and sails had to be tarred, and tar and pitch were also used as preserving materials for building purposes. With the development of the world's shipping, fishing, and other industries, the consumption of tar and pitch grew enormously. The invention of steam and motor ships, the development of the oil industry, and the replacement of tarred rope by manilla and wire rope did not greatly diminish the use of tar products, as they had become necessary factors in many new industries, and at present wood tar, pitch, turpentine, and flotation oils, obtained from tar distillation, are used in the rope, oakum, tarpaulin, rubber, mining, insulating compound, brush-making, paint, varnish, polish, and other industries.

Methods of Tar Manufacture

The quality of tar products, in order that these may be used advantageously in the various industries, depends chiefly upon the methods of production adopted. The following are the principal methods used :—

1. *Pit Method.*—This is the oldest process. Charring stacks are set on some rising ground, or earth thrown up for that purpose, and a pit is then made, at the bottom of which, in the centre, a hollow place is dug out; from this a channel is cut to some distance from the kiln. Resinous wood, also pine stumps and roots, are then stacked vertically towards the centre of the kiln, which is generally made to taper from the ground. These roots and stumps are afterwards completely covered with a layer of clay, earth, or pieces of peat, in order to confine the flames. The top of the kiln is then set on fire, and the tar, driven by the hot temperature, flows down the hollow, and thence into the channel where it is collected. By this process, which takes some forty-eight hours, only tar and charcoal are obtained. The pit method still exists in Umea, Lulea and Haparanda districts (in the north of Sweden), Wasa and Uleaborg districts (Finland), and in some parts of America.

2. *Ovens and Retorts.*—These were introduced later, and paved the way for the recovery of turpentine and other products in addition to the tar and charcoal. Small ovens were invented at the end of the eighteenth century, and are up to the present time chiefly used in the north of Russia (Archangel and Vologda districts) where the renowned Archangel tar is produced. It consists of a conical shaped oven, having an inner and outer wall, which join towards the top of the oven. This oven is erected on a brick foundation, the bottom of which inclines slightly towards the centre where a vent is made, connected by means of a brick channel with a sump situated at a little distance from the oven itself. An outlet from the oven is made at the top, and another outlet at the side, the former being used for charging the oven with wood, and the latter for the removal of the charcoal. Two furnaces are built between the inner and outer walls of the oven, each having a chimney. The oven is filled up with about 200 cubic feet of resinous pine roots and stumps cut into small pieces, and placed vertically. The two outlets are carefully closed with bricks and cemented with clay, in order to avoid leakage. When all is prepared, the furnaces are lit, and, as the temperature of the oven rises, the tar, turpentine and acids flow through the bottom vent into the brick channel. In order to separate these three products, there is a condenser installed over the sump, the turpentine thus obtained being of a very good quality, with a mild odour.

3. *Large Ovens or "Turpentine Ovens."*—These exist in Volyhn-Pinsk and Wilno-Bjalostock districts of Poland, and in the Kasan district of Russia. The capacity of these ovens is about 8/10 cubic fathoms of wood, and their object is to dry the resinous wood and roots and to obtain turpentine only, When the turpentine ceases to run the operation is stopped.

and the wood, which still contains tar, is then removed from the large oven and placed into a specially constructed small oven or retort, in order to recover the tar and obtain charcoal. By this method also a very good quality of turpentine is produced, which is known as "oven turpentine."

4. *Small Retorts or "Kasans."*—These contain moving wire baskets, for the purpose of extracting the charcoal from the retorts, and were introduced into the Ural, Volga, Kama and Kasan districts of Russia, also into the ore and iron districts of Sweden, for the special purpose of obtaining charcoal suitable for the iron industry. The process of producing tar and turpentine by this method is very similar to the oven process, but owing to the high temperature raised and the influence of the iron retorts the tar is much darker, and the turpentine is of a heavy specific gravity, with a strong smell.

5. *Large Cylindrical Retorts.*—These are made of iron plates and are advantageously used in the north-western parts of Russia, Poland and their neighbourhoods. The retort has a capacity of some 700 cubic feet of wood, and is vertically erected on a brick foundation. It is surrounded up to the top by a brick wall, leaving a space in between for heating the retort. The foundation inclines towards the centre, where a vent connected with an underground brick channel leads to a sump a short distance away. Situated about half-way up the retort is a wide copper pipe, connected to one or two condensers, special cooling arrangements being provided for the recovery of the turpentine. The tar flows down into the channel, where by special means the thick tar is separated from the tar oil. By this method factory-made tar is produced and the turpentine is of the usual quality.

6. *Other Types of Ovens or Retorts.*—Besides the foregoing types of ovens and retorts there are many others in existence, based on the same principles. The latest type successfully used in America, Sweden and Finland is the Michigan oven, sometimes known as the "Car" type, which is worthy of mention. By this method large oven retorts, holding about 10 cords each—say, 1,300 cubic feet—are charged with cars loaded with resinous wood, these being run into the oven and allowed to remain there until the wood is charred. They are then hauled into iron coolers, which are sealed up, and the charcoal allowed to cool by contact with air. The tar and turpentine are run off into special tanks through separate pipes connected with the retort. The resultant tar is a factory-made quality, and the turpentine is known as destructive distilled wood turpentine.

Pitch Manufacture

Pitch is produced by the distillation of tar, and the quality of the pitch depends upon: (*a*) the method of distillation adopted; and (*b*) the kind of tar distilled. A well-known pitch is that produced in Archangel (known as Archangel pitch), being made from the original Archangel thick tar, which is rich in resins. The distillation is carried out at a low temperature, only the light tar oil and acids being extracted, and the whole of the residue is converted into pitch. Other pitches are mostly a residue obtained by distilling tar and extracting the light and heavy flotation oils. The quality of the pitch differs according to the quantity of resin left in it, the care with which the distillation is carried out, and, as already mentioned, the quality of the tar used as a raw material.

Statistics of Production

The pre-war annual production of Russian naval stores has been estimated at about 60,000 tons of wood tar, 10,000 tons of pitch, and 16,000 tons of turpentine. The export from Archangel in 1913 accounted for 11,200 tons (74,281 barrels) of tar, 6,600 tons (26,584 casks) of pitch, and 1,000 tons (6,165 barrels) of turpentine. In 1924 these exports were about 5,700 tons (38,000 barrels) of tar, and 1,600 tons (6,500 casks) of pitch, the turpentine figures being not yet available.

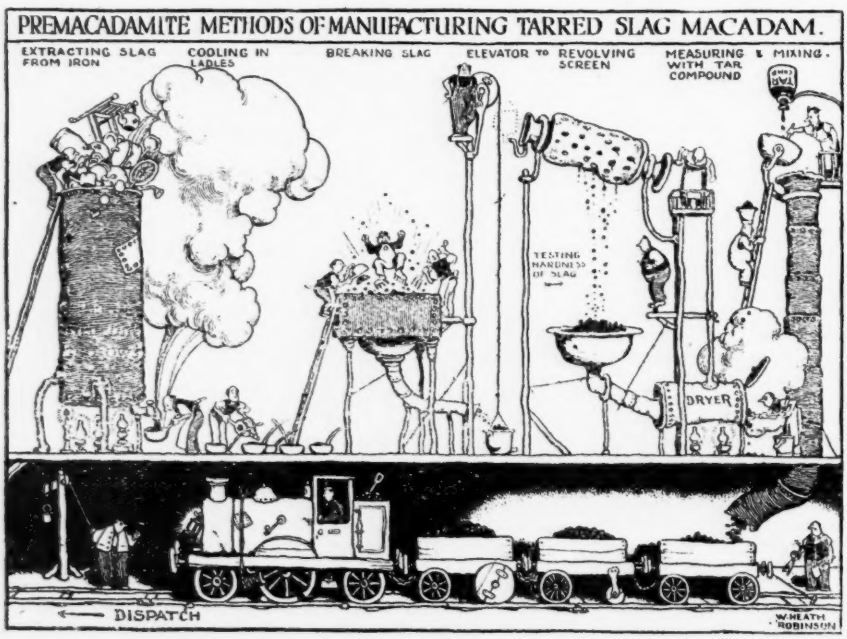
The exports from the U.S.A. in 1913 are given as 7,800 tons (62,346 barrels) of tar and pitch combined. In 1923 this figure increased to 9,300 tons (74,692 barrels), and about 1,300 tons (8,000 barrels) of wood turpentine were also exported. The export from Sweden in 1913 was 8,000 tons of tar, 140 tons of pitch and 230 tons of turpentine. In 1923 the exports amounted to 6,400 tons, 170 tons and 660 tons respectively.

The Advantages of Tar in Roadway Construction

THE Public Works, Road and Transport Exhibition, held at the Royal Agricultural Hall in London, concluded on Thursday, after a week of successful business.

A considerable number of tar firms exhibited their products, and tar boiling and other plant used in roadway construction was much in evidence.

A conference was held in the Congress Hall during the course of the exhibition, and on Tuesday morning an interesting paper on "The Use of Tar in the Construction of Roadways" was given by Messrs. T. Glover, C.B.E., and A. Collinson, the chair being taken by Sir Henry Maybury, of the Ministry of Transport.



If the question be fairly considered, it was pointed out, the overwhelming conclusion would be that tarred road surfaces are a success, and the practice of dressing roads with suitably prepared tar (followed by the application of stone chippings in sufficient quantity to form a compact wearing layer) has resulted in the abolition of dust on the highways. The practice of dressing road surfaces on a large scale with oil and tar has been traced to about the year 1896, when non-volatile oils were used in the drier regions of the United States for spraying the ballast of railways. It was soon found that the well-oiled roads were dustless, and that oil helped to mend a road surface, and remained part of it. The oil was sprinkled at a high temperature, and three applications were made the first year, two the

second, and one the third year. The dust of the road surface and the oil made a kind of asphalte.

Tarred Roads

Oils produced from coal locally produced at convenient centres, in the form of tar, were brought into use in the first place entirely for the abolition of the dust nuisance some twenty years ago. The penetrating quality of the oils in the tar had a distinct attraction for the road engineer, who was then dealing almost entirely with water-bound roads. The adhesive resinous part of the tar, however, was found to have considerable protective qualities in preventing the attrition of the aggregate forming the road crust, and a demand soon arose for a quality of tar having a higher percentage of the adhesive resins and a lower percentage of the volatile part of the tar, which was found to be of great value as a binding agent for surface dressing and in the tarring of aggregates for tarmacadam work.

Broken iron, slag or stone roads laid as tarmacadam are probably the most economical surfaces for modern traffic. The selection of tar which complies with the Roads Department Specification for tar No. 2 should be based on securing the maximum amount of adhesive and setting properties, in line with the nature of the aggregate to be used, and the conditions under which the tarmacadam is manufactured. Climatic conditions, too, must be considered, and it should not be difficult to adopt a summer and winter specification for the tar used in the manufacture of tarmacadam and its application for the respective seasons. Such specification to achieve the best results, would take account of the heat values of the stone and tar in the manufacturing operation, and the important factor as to whether the material is for laying immediately or not for some considerable time after its manufacture. An intelligent anticipation of these factors might also take into consideration a better gradation of the stone to secure a smaller percentage of voids than that of present practice, thereby producing a denser wearing course.

Grouting

For grouting the selection of a highly viscous tar with maximum adhesive and setting properties is essential, and its application made to the rolled stone at a temperature between 250° and 300° F., either by hand or pressure. The road is then immediately covered with a dusting of ⅜ in. screenings, and well rolled. Good results are obt ined in many towns with tar supplied direct from the gasworks, which has simply been dehydrated in a simple form of plant. The specifications issued by the Road Board have been of much assistance and the owners of proprietary articles have done much good work by standardising their specialities. One large firm of distillers makes regularly to 17 different specifications.

At the present time there appears to be a tendency on the part of the authorities to favour imported tars from other sources than coal. These petroleum pitches are applied at a temperature of 300° F. and over, and have little penetrating power, hence they cannot be used with advantage on water-bound surfaces, but they leave a thicker coating than ordinary No. 2 tar; similar preparations to oil pitches can be made in coal tar distilleries. Hitherto great quantities of pitch and oils derived from tar have been exported for the making of patent fuel and the preservation of timber. It will probably be agreed that a better use for the pitch can be found in road making and road maintenance. The chief concern should be good reliable results in use, coupled with a satisfactory return for an important by-product.

Tar and River Pollution

Prejudice has been raised against coal tar on the ground that washings from roads made or surfaced with it injure fish and aquatic vegetation. In some special cases this may be true, but on the vast majority of our roads such is not the case, and no sufficient reason exists for excluding tar therefrom.

The recent Memorandum issued by the River Pollution Committee of the Ministry of Agriculture and Fisheries states that the committee, while desirous that suitable bitumen shall be used on roads in proximity to streams, which obviously are only a small percentage of the whole of the roads of the country, point out that it is no part of their policy either to advocate the general use of bitumen or to deprecate the use of tar.

Description of Exhibits

Among the exhibitors of tar distilling plant were W. and J. Glossop, of Hipperholme, Halifax, who showed their patent continuous operation plant, and specimens of "Super Tar" and "Vitar." A large mechanical steam sprayer with a capacity of 1,000 gallons was also on view at this stand. The Phœnix Engineering Co., of Chard, Somerset, showed their "Phœnix Rapid" continuous hand tar spraying machine, while John Allen and Sons, of Oxford, exhibited "one man" trucks for the handling of barrels. Thomas Coleman and Sons, of Derby, patent "Arch" boiler for the rapid heating of tar was exhibited, and the Mechanical Tar Spraying Co., of 25, Victoria Street, London, also showed apparatus for road construction. On the stand of Johnson Brothers, of 79, Mark Lane, London, was a large double furnace tar boiler, the plant exhibited having been sold to a firm of Swedish contractors. Braham, Patterson and Benham, Ltd., of Limehouse, London, showed spraying machines for tar and boilers, and Sir W. G. Armstrong Whitworth and Co., of Manchester, had a similar exhibit on their spacious stand. F. G. Barnes, of Godalming, showed improved patent tar spraying and road brushing machinery, and John F. Wake, of Darlington, exhibited special machinery for the making of tar aggregates for roads. Hutchinson's Testing Apparatus, Ltd., of 21, Great Peter Street, London, showed instruments used in the examination of tars, while Baird and Tatlock, of 14, Cross Street, Hatton Garden, had an exhibit of laboratory apparatus.

Tarmacadam exhibitors included Crow Catchpole and Co., of Aldwych House, London, by whose permission we reproduce from their catalogue the amusing cartoon on the opposite page. Since the last exhibition this firm has commenced the manufacture of tarred slag macadam and the artist, Heath Robinson, gives his ideas of "premacadamite" methods of making this product! "Tarmac" material for tar-bound road construction was exhibited by Tarmac, Ltd., of Wolverhampton, and Mountsorrel Tarred Macadam, Ltd., of Loughborough, also showed their product. Wake and Co., of Middlesbrough, exhibited tarred slag and limestone.

Among the general road exhibits Hadfields, Ltd., of Sheffield, exhibited crushing machinery for road materials in "Era" manganese steel, while the Pulsometer Engineering Co., of Reading, showed a selection of sewage pumps. The Castner-Kellner Alkali Co., of Liverpool, exhibited liquid chlorine for the treatment of water and sewage, and other general chemical exhibitors included Brunner, Mond and Co., who showed silicate of soda for case-hardening concrete roads. The Callow Rock Lime Co., of Cheddar, Somerset, exhibited "Calime," a super hydrated material, also for use in concrete road-making, and the Buxton Lime Firms Co. also showed limestone suitable for this purpose.

Important Synthetic Ammonia Contract

An important contract amounting to £100,000 has been placed by Synthetic Ammonia and Nitrates, Ltd., with the Darlington Forge Co., Ltd., for a large number of forged ingot steel towers. This news points to further developments in synthetic ammonia production, and the contract is no doubt the outcome of the £2,000,000 Treasury guarantee under the Trade Facilities Act, by means of which an issue of £2,000,000 5 per cent. guaranteed debenture stock was offered and subscribed in May last.

The official prospectus of the issue stated that by means of the proceeds, together with other moneys to be supplied by the company, it was proposed to increase the output of pure ammonia from 50 tons per day to 200 tons per day, the equivalent approximately to 270,000 tons of sulphate of ammonia per annum.

German Dyes for U.S.A.

The percentage of dyes imported into the United States during September increased to 62 per cent. in the case of Germany, compared with 51·5 per cent. in August. In the case of Switzerland the percentage fell to 21 per cent. in September from 36 per cent. in August. Very small percentages of the shipments came from Italy, England, France, Belgium, Canada, and Holland.

Modern Tar-Distillation Plant and Process

By H. M. Spiers, M.A., B.Sc., F.I.C.

The author discusses the tar-distillation process and the development of modern plant, describing several types of continuous still. Figures 1, 2, and 3 are reproduced from Warne's "Coal Tar Distillation."

THE distillation of tar is an important industry, the annual output of crude tar in this country alone exceeding one and a half million tons. Very insignificant quantities of tar are used in the raw state, and by far the largest proportion of the tar manufactured in gas works and by-product coke-oven plants is submitted either to complete distillation to pitch, or to partial distillation (dehydration). The distillates provide raw materials from which large numbers of crude and purified products are prepared by processes involving fractionation, separation in acidic, neutral and basic constituents by appropriate means and refining. The manifold applications of the constituents of tar are too well known to require elaboration, but mention may be made of their use in connection with the manufacture of dyestuffs and paints, drugs, fine and photographic chemicals, artificial tannins, bakelite and other resin products, fuel for internal combustion engines, explosives, disinfectants, wood preservatives, flavouring essences and perfumes. As regards the distillation residues, the production of patent fuel necessitates the use of large amounts of pitch, while in the construction and maintenance of roads, nearly half a million tons of tar distilled to eliminate water and the constituents of boiling point below 200–250° C., are annually consumed in Great Britain.

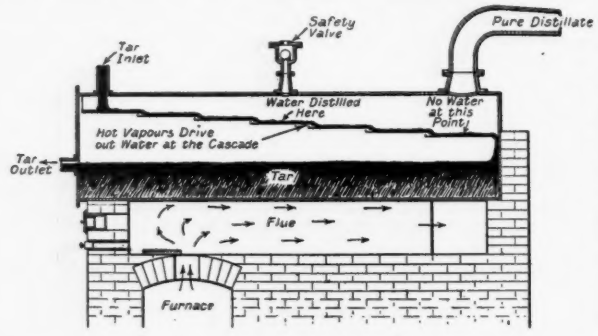


Fig. 1. PATENT CASCADE TYPE OF STILL FOR CONTINUOUS TAR DEHYDRATION OR DISTILLATION PLANT.

Advantages of Continuous Stills

Complete distillation of tar to pitch involves, firstly, the removal of water, normally present to the extent of some 5 per cent. in the crude tar. At the same time, part of the light oil fraction distils over in amount depending on the water content of the tar, and on the method of distillation employed. Tar dehydration is by no means a simple operation, since there is a tendency for the mass to froth. On the other hand, once the water has been removed the remaining stages of the distillation present no great difficulty. It is due to this that the design of tar-distillation plant has developed along the lines of finding a satisfactory means of eliminating frothing troubles. Moreover, for ease in operation and in order to minimise fire hazards, ever present to some extent with a liquid of the nature of tar, continuous stills have been introduced and these have the advantage that the amount of tar in the still at any moment is much less than is the case with intermittent stills. There is thus a wide choice of available apparatus, ranging from pot-stills with a capacity of 50 tons of tar to a continuous film distillation plant, with the same daily throughput, and exposing at any moment considerably less than a hundredweight of tar to the distillation temperature. Continuous stills offer, also, the advantage that the charge is in motion and heat transmission is, in consequence, facilitated. Nevertheless, the growth of carbon deposits on the heated metal surfaces involves periodical dismantling of the plant for the purpose of removing these growths, unless special means are taken to prevent their formation. Tar stills may be heated by coke, by gas, or, in the case of vacuum stills, by steam and superheated water.

Modern Types of Plant

Continuous plants are, in general, made up of single stills or units through which the tar passes in series, the number of units depending on the number of fractions which are desired, and on the extent to which distillation is to proceed. For the preparation of road tars, distillation is carried to a stage not very far beyond that at which the water and light oils are removed, and a single unit is then applicable. For distillation to pitch, two, three, or four units may be employed. Each still of the series is fitted with a vapour off-take leading either to a condenser or to a dephlegmating column, which enables the vapours to be separated into light and heavy fractions,

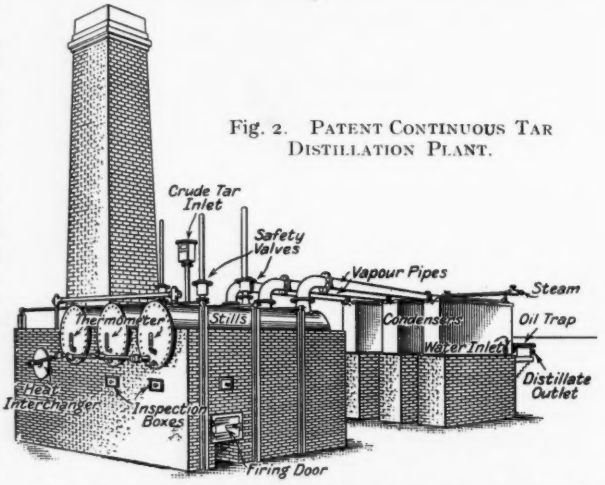


Fig. 2. PATENT CONTINUOUS TAR DISTILLATION PLANT.

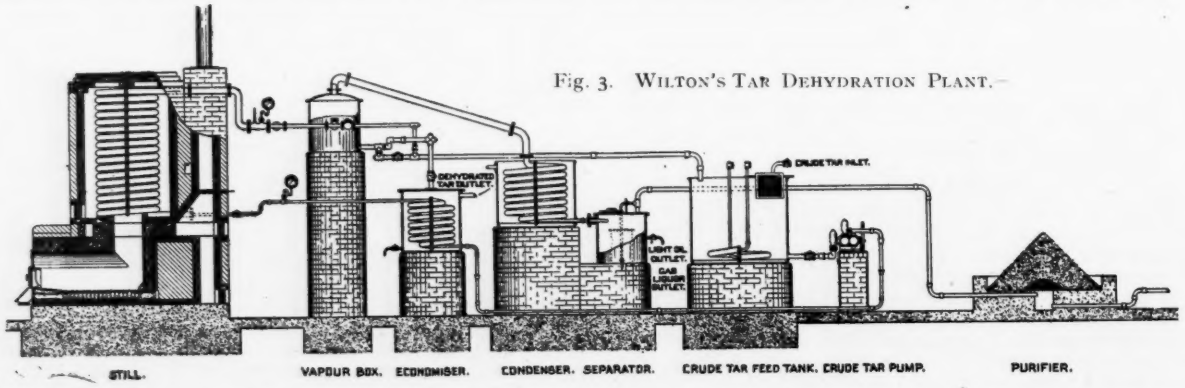


Fig. 3. WILTON'S TAR DEHYDRATION PLANT.

the heavy fraction condensing in the column, and the light fraction passing to a condenser. In many instances the condensers function as heat interchangers, serving to heat the crude tar supplied to the primary still. The crude tar may be fed to the still either by gravity or by use of a pump. In the last still, steam is introduced to facilitate removal of anthracene, or the pitch leaving the still may be treated with steam on its way to the pitch cooler. Non-condensable foul gas is either purified by passage through an oxide purifier prior to its discharge to atmosphere, or is burnt in the furnace flues.

Of the various types of continuous still in common use, four are worthy of a detailed description as regards their salient features.

1. *The Hird Plant.*

The stills are rectangular and are disposed horizontally. A central longitudinal baffle causes the ingoing tar to travel from end to end of the still and then back again. The furnace gases which serve as a heating medium are conveyed by way of four tubes expanded into the end plates of the still and running along its whole length. In a modification due to Wikner, the dehydrating unit is steam heated by way of tubes situated a little below the tar level, and the vapours of steam and light oil are condensed, before leaving the still, by passage through coils immersed in the lower layers of tar, their latent heat of condensation serving to heat the lower layers. Since only the upper portions of the still contents are actually boiling, frothing is eliminated. The plant is manufactured by W. C. Holmes and Co., Ltd.

2. *The Cascade System.*

In this system, also, the stills are horizontal (*see* Figs. 1 and 2). The tendency towards frothing is overcome by allowing the preheated incoming tar to flow on to the first of a series of trays arranged step-wise along the length of the still and situated in the vapour space. The tar travels along the trays in a thin layer, and is heated by the vapours generated from the main body of the tar and leaving the still by way of a swan-neck situated at the end of the still remote from the charging end. By the time the last tray of the cascade is reached, the tar is free from water and trickling over the end of the tray; it then travels along the still to the end at which the crude tar enters. The residue tar leaves the still continuously and passes into the second still where middle oils are removed. The second and third stills are of the conventional type without cascades. The first two stills are heated by direct heat, the third still being heated by the waste gases which serve also to assist the action of a tubular preheater, in which heat interchange between the crude tar and the outgoing pitch is effected. Clayton Son and Co., Ltd., are the makers of this plant.

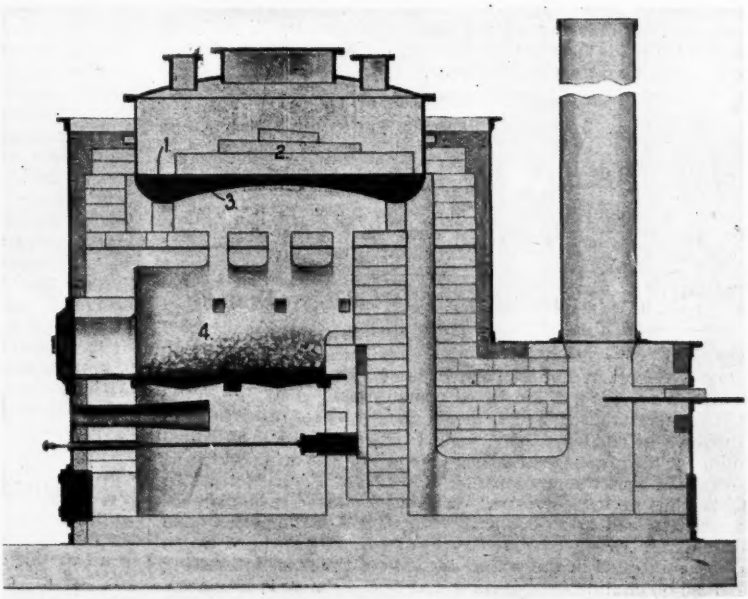


Fig. 4. Diagrammatic Section of T.I.C. Still.

3. *The Wilton Plant.*

This plant is of the semi-continuous type, dehydration being effected continuously and subsequent distillation intermittently in pot stills (Fig. 3). The dehydration unit comprises a pressure coil through which preheated tar is forced. The tar is thereby superheated to a temperature of 140° C., corresponding to a pressure of 30-40 lb., and finally passes to an expansion chamber where water and light oils are flashed off. The residual dehydrated tar flows continuously to one of two pot-stills which are worked alternately, the one being filled while the contents of the other are undergoing distillation. The makers are the Chemical Engineering and Wilton's Patent Furnace Co., Ltd.

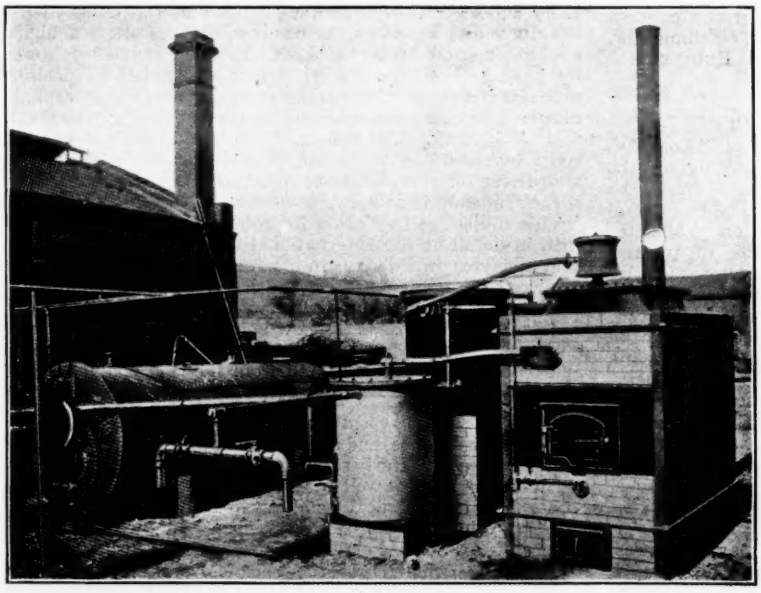


Fig. 5. Aberystwyth Tar Plant (T.I.C. System).

4. *The T.I.C. System.*

The stills are shallow cylindrical vessels (Figs. 4 and 5). Tar is fed in at a point on the axis of the cylinder and, flowing over the surface of a layer of lead covering the bottom of the still, is constrained to travel in a sinuous path to the periphery by the agency of a labyrinth floating on the lead. The tar film is but half an inch thick and the liquid flows through the still in about three minutes. Distillation, even in the case of a very wet water-gas tar, occurs without any tendency towards frothing; heat transmission is rapid and the growth of carbon deposits is avoided since the tar does not come directly into contact with the still bottom. Further, no joints are exposed to the tar, so that leaks cannot develop. The large mass of molten lead provides a considerable reserve of heat, thereby assuring uniform conditions even though the water content of the cured tar may be fluctuating.

Due to the rapidity of distillation and to the avoidance of overheating, cracking of the tar is prevented. The T.I.C. System plant is made by the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd.

Vacuum Distillation of Tar

Raschig has devised a plant for the continuous vacuum distillation of tar and a T.I.C. plant working under vacuum has also been designed. So far, however, vacuum distillation has not come into extended application as regards tar, though, should low temperature carbonisation processes be brought to maturity, it is likely that distillation under diminished pressure will be employed for working up the tar.

The Elimination of Oil from Water

[*To the Editor of* THE CHEMICAL AGE.]

SIR,—In connection with the interesting editorial "Oil Removal from Water" in the issue of THE CHEMICAL AGE of October 17, 1925, there is, of course, no need to emphasise the troubles caused by oil in boiler feed water, especially in the way of corrosion of the plates and reduced heat transmission. Thus, vegetable oils give free fatty acids which at the boiler water temperatures of 300°-400° F. will form iron salts, thus giving corrosion, while oil saturated scale deposits are apt to lead to serious local "burning" of the plates. No ordinary filtration treatment will, of course, get rid of traces of oil emulsified in the water, and one of the most interesting British oil elimination plants is that of the Paterson Engineering Co., Ltd., of London, which operates on the coagulent principle, using aluminium sulphate and soda ash. The plant is generally in the form of a rectangular tank, and the greasy water flows in at the top through a "V" notch weir, passing first to an upper measuring tank, whilst a large float in this tank controls, by means of valve levers, the supply of sulphate of alumina and soda ash reagents contained in separate small supply tanks. The water after being mixed with the chemicals flows along a horizontal mixing trough and is discharged down to one end of the main purification tank, which is divided by a partition into two parts, one of which contains a wood wool filter and the other a deep bed of quartz sand. In this way the precipitate containing the oil is separated, and the water, after passing through the filters in series, is discharged from the other end at the bottom of the plant, the sand filter operating on the downward principle.

The sand, which does most of the work, is cleaned automatically by means of a blast of air and steam supplied by an injector and a momentary reversal of the water flow, only requiring about 10 minutes attention every day. The plant operates quite easily in conjunction with a lime and soda ash or other type of softening plant, being particularly suitable, for example, in the utilisation of the heat in the exhaust steam of engines by means of a combined heater, oil eliminator, and softener.—Yours, etc., ENGINEER.

November 19.

Chemical Analysis of Coal Ash

THE first of a series of three Cantor Lectures on "Coal Ash and Clean Coal" was given by Dr. R. Lessing at the Royal Society of Arts on Monday, who said that the reactions taking place in the conversion of the mineral matter in coal into ash, such as the dehydration of silicates and the decomposition of calcium carbonate of pyrites, may involve single compounds, and are accompanied by loss of volatile compounds. In other reactions original constituents such as iron compounds are oxidised or reduced. Secondary reactions may affect the balance between volatile and non-volatile matter, while another class of reactions occurs between the residual mineral constituents and themselves. Their consideration would cover the whole field of the chemistry of silicates and ceramics. Some of these reactions have a profound influence on the proximate and ultimate composition of coals ascertained by ordinary routine tests. In arriving at an estimate of the true coal substance in a given coal, allowance should therefore be made for the water of hydration, carbon dioxide in calcium (or iron) carbonate (which according to the temperature employed may be more or less completely dissociated), the combination of organic sulphur with lime and alkalis, resulting in the formation of sulphates, the partial volatilisation of alkali chlorides or their conversion into carbonates and a number of other reactions for which reliable data are not yet available. Moreover, it had to be remembered that the incineration of coal is not a combustion process pure and simple, but is preceded or accompanied by non-oxidising thermal decomposition. Hence the detailed chemical analysis of individual coal components does not alone suffice for a complete study of the distribution of the inorganic compounds in coal; and it must be supplemented by methods of divulging their physical structure and articulation. This can be done by incinerating lumps of coal—uncrushed, instead of in the usual powdered mixture—when the ash is obtained in a form of a skeleton representing its original orientation in the compact mass of coal. Radiographic methods recently introduced by Kemp for the examination of coal provide an important adjunct to the study of its mineral consituents. The lecture was illustrated by a series of lantern slides and specimens illustrating the structure of mineral and other components in coal, and a demonstration of the carboscope devised by Mr. C. N. Kemp for the X-ray examination of coal samples was given. The remaining lectures will be delivered on November 30 and December 7.

Insulation in Refrigeration Work

THE manufacture of ice has become one of the great industries of the world, and in the United States the annual revenue of all the ice companies exceeds 46,000,000 dollars, while the amount of electricity consumed per annum in driving ice plant is over 3,000,000,000 kWh. The subject is of interest to the chemist and the chemical engineer, not only because of the many chemical uses of ice, such as diazotising and nitrating, but also because of the many technical problems that have had to be solved in the process of manufacture. For instance, there is the insulation of the chambers against the outside heat, and to-day granulated cork compressed into sheets and baked is almost universally employed, just as in the case of the storage of explosives.

In the past many substances were used, including sawdust, charcoal, slag wool, cork, hair felt, magnesium carbonate paper, asbestos, and even wood. In addition to non-conductivity of heat, however, other factors have to be considered, such as mildew or dry rot, absorption of moisture, and the tendency of the material to get out of position. Sawdust easily absorbs moisture, which reduces its non-conductivity, and dry rot is liable to start up, while charcoal also readily absorbs moisture and is liable to spontaneous combustion. Slag wool, an absolutely fireproof efficient non-conductor of heat which does not take up much moisture, has the drawback that when it is packed in the compartments it begins to settle down by gravity and vibration, leaving the top portion partially exposed, while "tamping" the material down breaks the fibres and increases the conductivity. Cork is a highly efficient non-conductor of heat, and compression followed by baking eliminates the tendency to get out of position much better than the earlier methods of adding asphalt, bitumen, or other material and then compressing into sheets without heating. The baking also improves the non-conductivity by the decomposition of all the volatile matter present, and drives off every trace of moisture, thus eliminating any slight tendency to mildew.

This subject of insulation for refrigeration work was dealt with in detail at the International Congress of Refrigeration held last year in London, in a paper by Mr. James Hatton, director of Sutcliffe Brothers and Bryce, Ltd., of Hyde, near Manchester, and it is interesting to note also that granulated cork sectional coverings are now being used for the lagging of refrigerator pipes through which the low temperature brine and ammonia circulates to and from the cold chambers.

Mechanical Handling

THE runways, cranes, and other mechanical handling apparatus manufactured by Herbert Morris, Ltd., Loughborough, are too numerous and too well known to need description. All the economies of mechanical handling in connection with every trade have been exploited by this firm and their latest productions are described and illustrated in Booklet No. 104 now issued. The demands of the chemical works and testing laboratory are equally catered for, and economical stacking machines are a feature.

Coal-Tar Colour Lakes

Mr. H. Jackson on a New Era

In the course of a paper on this subject read at the first meeting of the recently formed Manchester Section of the Oil and Colour Chemists' Association, on Friday, November 20, Mr. H. Jackson, of the British Dyestuffs Corporation, said that a new era had been opened to the lake industry by the appearance on the market of coal-tar dyes, and lake-makers had not been slow to seize the opportunity. When it was realised that the coal-tar colour lakes were used in oil and water paints, artists' colours, distempers, lithographic and printing inks, enamels, lacquers, wallpapers, coated papers, sealing wax, typewriter ribbons and carbon papers, among numerous other articles, it would be seen how important these lakes were from the point of view of our everyday life.

The newest use for coal-tar colour lakes was for the colouring of rubber, a use which had been rendered possible by the comparatively recent appearance of accelerators, by means of which the vulcanisation of rubber was effected at low temperatures. This field of application was expanding very rapidly, although there were several factors besides temperature with which to contend. Sulphuretted hydrogen, for example, was formed during the process of vulcanisation, and it was necessary that the colour should be fast to it. In addition there was the question of fastness to open steam under pressure. Quite a number of coal-tar colour lakes were meeting these requirements and were being successfully applied.

The dyestuffs industry, the lake-making industry, and the paint, varnish, printing ink, and paper industries were all very closely allied. All of them had enormous sums invested in plant and materials, and each member of the group depended more or less upon the other members for its existence ; without the dyestuffs industry, the lake and other allied industries would not be able to exist, and vice versa. That the dyestuffs industry had been able to establish itself in one of its very important branches—the manufacture of colours for lake-making—was due very largely to the co-operation between the lake-makers and the dye manufacturers. The introduction of coal-tar dyestuffs sounded the death knell of a large number of other pigments, though there were still some which managed to hold their own. In some cases, however, it was merely a matter of price which kept these products alive, and he would not like to prophesy as to when they would be displaced by coal-tar dyes.

Pre-war Spoon-feeding

Before the war the accusation was often made that the lake industry was being spoon-fed, and that it was to a large extent in the hands of foreign dye-makers. That statement was never wholly true and was certainly not true at the present time. It was true that the lake-maker must obtain his initial information regarding methods of working from the dyestuff manufacturer who had discovered a new colour, because the dye-maker at that moment was the only person who knew anything about it. Lake colours were a type which were quite separate from the ordinary run of textile dyestuffs and needed very careful treatment and handling. A very careful watch must be kept on the manufacture of the base, because if sufficient care was not taken regarding temperature, dilution, and washing, the finished lakes in many cases would suffer considerably. The physical condition of the finished lake was also dependent largely on the base. Pigment scarlet, for instance, sometimes behaved in an extraordinary manner, yet when handled properly it was a most desirable colour and one of the most important in the range of lake colours.

Apart from the question of solubility, which was a matter to be carefully watched, one of the greatest difficulties with pigment scarlet was to obtain lakes which would give strong undertones. This question of undertone strength was controlled to a large extent by the physical condition of the lake. A method had now been evolved by which lakes could be made with this product which possessed extraordinary strength in undertone, though the lakes were found to be very sensitive to grinding. It had been observed that they could be ground until a certain strength of shade was reached, and then the colour could almost be ground out of them. No explanation could be offered as to why they should grind so weak, but it seemed to be a feature also of other colours. It was possible, however, that there was such a thing as getting the lake into too fine a condition.

Unexplored Fields

There were still extensive, though unexplored, fields in the lake-making industry, and there was plenty of room for the investigator both to improve the properties of the existing lakes and to discover new types. The manufacture of lakes was an industry in which one must have practical experience before any useful research work could be carried out, and it was for that reason that they must look to the works chemist rather than to the highly trained academic chemist. Lake manufacturers must realise that research and investigation must be a fundamental part of their policy if they were to hold their own against foreign competition. However large or small they might be, all lake-making concerns should allow their chemists as much time and opportunity as possible for original investigation work, and the chemists should also be afforded ample opportunity to establish close personal contact with the actual consumer of the products of their industry.

In the course of the discussion, Mr. J. B. Shaw, the chairman of the Manchester Section, said the question of grinding was an extremely interesting one. The principal point, so far as the works were concerned, was the type of machine that was being used, as very different results could be obtained with different machines. Moisture taken up by the colour had a very important influence, so far as strength of shade was concerned, on the grinding results. The addition of a small percentage of Turkey red oil, about a quarter of 1 per cent., had a decidedly advantageous influence on the colour, and would also materially affect its physical appearance. By this addition the strength was increased by fully 5 to 10 per cent. It was well known that the azo colours were particularly susceptible to grinding, and each colour ought to receive individual treatment. The acid and basic colours were affected to a much less extent, if at all.

The British Idea of Co-operation

Dr. H. H. Morgan, president of the Association, who presided over the meeting, said the alteration in strength on grinding was a physical rather than a chemical question, and other important matters were the question of moisture and the use of alumina hydrate as a base. Those three points were of vast importance to the lake manufacturer, and were to a large extent the cause of the troubles experienced by the user. He had a good deal of sympathy with what the author had said regarding spoon-feeding. With more research into fundamental problems they would be able to make the manufacture of lakes more of a science and less of an art. As it was there was a good deal of an art about the industry, and there must be a certain amount of spoon-feeding in consequence.

Earlier in the evening Dr. Morgan, referring to the formation of the new section of the Oil and Colour Chemists' Association, said the step that had been taken would doubtless meet with criticism in some quarters. At the present time the cry was for amalgamation, and the increasing number of bodies representing chemistry and the various branches of chemistry was deplored by many. They need not take that criticism too much to heart. The British mind was more content with separate entities where each organisation could express its own individuality, although the drawback to that was that all societies pursuing their own lonely course were apt to become too narrow and their vision too limited. That could be got over by joint meetings and discussions, though it was essential that there should be a loose federation of the various bodies in order to avoid unnecessary overlapping.

Radiation Pyrometers

A radiation pyrometer suitable for temperatures of from 500° C. to 2,000° C., is particularly suited to the requirements of the chemical and metallurgical industries. The "Pyro," produced by the Bowen Instrument Co., of 9, Newton Road, Leeds, is of this type, is easily portable, and is completely self-contained, requiring no batteries or other aids. The instrument is already used by various important chemical concerns.

British Dyestuffs: Reconstruction of the Corporation

Government Retires: Position and Prospects of the Undertaking

THE adjourned sixth ordinary general meeting of British Dyestuffs Corporation, Limited, was held at Manchester on Wednesday, November 25. It was followed by an extraordinary general meeting of the company and by separate class meetings of shareholders to approve the scheme of reconstruction submitted by the directors.

Lord Ashfield (the chairman of the company) presided, and there was a large attendance of shareholders.

Lord ASHFIELD, in moving the adoption of the report and accounts for the seventeen months to March 31, 1925, said:

This is the first general meeting of the corporation at which I have presided. It is also one of the most important, if not *the* most important, in the corporation's history; and it is a matter of extreme regret to me, and I am sure this feeling is shared by my colleagues, that it is necessary to follow this meeting by a series of extraordinary general and class meetings at which the preference shareholders will be asked to forgo their preferential rights, and both classes of ordinary shareholders will be asked to submit to a reduction of the nominal amount of their shareholding in the corporation. In the subsequent meetings I will endeavour to show why this sacrifice is necessary; that it should be required cannot come upon you as a surprise, for it is the realisation of a policy which has been long anticipated and advocated by some among you who have given public expression to their opinions; it is indeed the inevitable consequence of the conditions under which the corporation has been trading during the past few years. The delay in giving effect to this policy has been caused by the desirability of making certain other alterations in the corporation's constitution at the same time. In view of the large amount of business which has to be got through this morning, I do not propose, at this ordinary general meeting, to make any detailed statement in regard to the corporation's activities during the period of seventeen months covered by the accounts which are in your hands. The report, which accompanies the accounts, refers briefly to the salient features of the trading and any question can probably be more appropriately dealt with at the extraordinary general meeting, which will immediately follow this one.

In addition to dealing with the report and accounts, which are certified in the usual form by the auditors, it is necessary for you to deal with the appointment of directors, but I think that I shall be meeting your wishes if I ask you to adopt only the resolution dealing with the report and accounts and then to adjourn this meeting until immediately after the extraordinary general and class meetings which follow, when the re-election of directors can be dealt with. I will therefore move:

"That the report of the directors and the statement of accounts for the seventeen months to March 31, 1925, be received and approved."

The resolution was carried.

Extraordinary General Meeting

At the extraordinary general meeting, which then followed, Lord ASHFIELD said: This extraordinary general meeting of the shareholders of the corporation has been called to discuss a scheme for the reorganisation of the corporation's business. Particulars of the scheme and a memorandum explaining its main features have been circulated to you. It is proposed, not only to write down the assets and correspondingly reduce the capital, a sacrifice to which all classes of shareholders contribute, but also to adopt new articles of association. I have asked all classes of shareholders to be present at one time, although there will be separate votes of the various classes at appropriate meetings, because I wish to avoid inflicting the same or a smiliar speech upon shareholders who hold shares in two or three classes, and to save their time. May I first of all repeat my expression of regret that circumstances have made it impossible to submit the board's proposals at an earlier date, but I think it will be agreed that any scheme which did not deal with the question of the Government share holding and veto must, as the circular which you have received states, have been partial and ineffective, and, until the negotiations with the Government had been brought to a successful issue, your board were not in a position to submit a scheme to the shareholders. It will probably be convenient if, in my remarks, I follow the same general order as that in the circular; but in so doing I shall endeavour to avoid repeating what you have already read in that memorandum.

A Review of the Past

It is, therefore, unnecessary for me to refer to the corporation's history in any great detail, a story with which you are only too well acquanited; but it is, I think, important to remind you that the association of the Government with dye-making was primarily for the benefit of the colour using industries. The inauguration and success, or otherwise, of British Dyes, Limited, the parent of your corporation, was an affair of the Government's and of the colour users, who, in the first instance, provided all the money required by that company. They were primarily concerned in ensuring that colour sufficient in quality and quantity was produced to meet the country's needs in industries which annually manufactured goods estimated at pre-war values to be worth 200 millions, and involved the employment of a million people. The corporation's parent, therefore, could not be regarded as an ordinary commercial trading company, since if the proprietors did not receive dividends, they aided in the supply of, or were themselves supplied with, goods which were essential for their own and other businesses, and this supply was of paramount importance.

The character of the whole scheme was, however, entirely changed when your present corporation was formed and an invitation extended to the general public to subscribe for the additional capital which was necessary to discharge the commitments, past and future, of Br tish Dyes, Limited, and Levinstein, Limited, and to extend and expedite the manufacture of dyestuffs in this country; for, as soon as the ordinary public held the majority of shares in the corporation, it was no longer a matter of indifference whether the benefit from the undertaking accrued in the form of profits or the supply of goods. Unfortunately, however, although the character of the ownership was changed, the restrictions which in other circumstances had been imposed were, in turn, imposed upon the corporation.

Government Restrictions

It is difficult for anyone not intimately connected with the management of the undertaking to realise, although it may not be difficult to conjecture, the handicap that is imposed upon a trading concern by such conditions as are contained in the corporation's articles of association. They purport to control its prices, and they give power to the Government, acting through their appointed representatives, to veto agreements which the corporation might deem it expedient to make. These restrictions have been repressive of the corporation's activities, and have hindered its expansion; they made it impossible for its business to be conducted with secrecy or rapidity, two essential elements in obtaining commercial success; and they invited political interference with a commercial undertaking. They were safeguards against contingencies which no longer had to be feared; shackles whose utility had gone, but whose weight remained.

I am not insensible to the benefit conferred by the financial support of the Government at the time that the corporation was formed, and I am bound to say that the two departments principally concerned, the Treasury and the Board of Trade, have acted throughout in a considerate and conciliatory manner, not only in regard to the Government restrictions, but during the negotiations for their removal. This did not, however, prevent the restrictions themselves from militating very strongly against the successful management of the corporation.

I am addressing a meeting which is attended very largely, if not entirely, by men who are equipped with a very wide experience of business, and if I ask you to visualise a situation in your own business in which the Government had the power to interfere with and, at their discretion, prevent any arrangement which you and your board might unanimously agree was in the best interest of your undertaking, and, that, as a

result, exhaustive and endless discussions, not only with Government departments but with Cabinet committees, were necessary, you will perhaps better realise the difficulties which have confronted the board of the corporation, and how impossible our task has been. And I might emphasise that statement by pointing out that this form of Government interference does not apply to the dye industry as a whole, but only to one particular member of the industry. In other words, it has been possible for any other dye-making concern to do that which is denied to us.

Negotiations with the Government

I think from what I have said it will be agreed that, although a scheme of reorganisation of the corporation's capital is long overdue, it was vitally necessary that, before putting any scheme before you, your directors were right in deciding that a definite attempt must be made to place the corporation upon an ordinary commercial footing. I will not say much about the Government negotiations, with which I have been closely associated, except that they were both intricate and protracted, and, in spite of the help afforded by the departments concerned, and the Government directors, they imposed a considerable strain upon one's patience as well as upon one's powers of negotiation. Fortunately, they were successful.

Now let me refer to the conditions which the Government imposed in return for relinquishing the powers they possessed over the corporation's business. The first is the payment of the sum of £600,000, an amount arrived at after considerable inquiry and negotiation, and, in fact, approximately the market price of the shares at the time. I find it impossible to concur in a suggestion which has been put forward from time to time by shareholders that the Government should have surrendered their shares without payment, for the benefit of the other shareholders. Possibly one of the grounds for this suggestion is the mistaken assumption that the Government in some way guaranteed the undertaking. Let me say emphatically that, whatever the Government may have done, they certainly did not guarantee either the stability or the earning capacity of the corporation. In the exceptional circumstances arising out of the war they ventured a portion of the general taxpayers' money in a business in which the ordinary investor was also invited to embark. The Government are, therefore, primarily responsible to the general body of taxpayers, and only responsible to the shareholders as co-adventurers with them. The offer which is now before the shareholders, to sell the Government shares for £600,000, was not made in a niggardly or bargaining spirit. In order to be fair to those persons who subscribed to the undertakings and to free the corporation from the shackles which now confine it, I think the Government have made some sacrifice on behalf of a national industry, thus serving the true interests of those who use the corporation's products, but this has been done with due regard to the interest of the general taxpayers.

British Control Maintained

Apart from the payment referred to, the offer of the Government, which the directors have provisionally accepted, and which they ask this meeting to confirm, contains two conditions: The first that the British character of the concern be conserved by the provision that not more than 25 per cent. of its voting power may be foreign or foreign controlled. The carrying-out of this condition is left to the corporation itself, and it will no longer be necessary, as previously, to have the consent of the Board of Trade to each individual transfer of shares. The second condition requires that the corporation should keep in touch with the Government in regard to all matters of technical information and research in such manner as the President of the Board of Trade may direct. The object of this condition is to ensure that our activities in research, in those directions which may prove of utility for the defence of the realm, may be brought to the knowledge of the Government. Should the corporation make discoveries or possess technical information which may be of use for national defence, the Government will have first hand information and be in a position to negotiate for their use, but these negotiations would be with a company possessing entire commercial freedom, and, therefore, at liberty to make an ordinary commercial bargain. The very fact that these conditions have been imposed seems to me to negative the suggestion that the Government has ceased to be interested in the corporation, and merely sought to escape from an unsuccessful undertaking; although it has sold its shares, it wishes to retain an interest, at least in regard to certain aspects of the corporation's activities. I hope that we shall, out of our experience and discoveries, prove to be of real use to the nation, and that the Government will not be unmindful of the importance of giving assistance and encouragement to us in those matters which in a time of national peril, such as that from which we have recently emerged, will be of incalculable value to the Empire. Having entered into a provisional agreement with the Government, your board took steps with all possible expedition to place the whole situation before you, combining in one suggested scheme of reorganisation a writing down of assets, a reduction of capital, an amendment of the articles of association, and a consideration of the future policy of the corporation.

Scheme of Reconstruction

Now let me deal with the general scheme of reconstruction itself, and I will preface my remarks by saying that the circumstances in which this corporation's capital is being reconstructed are very exceptional indeed. It is most unusual for a company to reconstruct when it has more than a third of its assets (in this case nearly 3½ millions of money) in investments and cash, and with debts due to it nearly twice what it owes; and at least the corporation is fortunate in this, that its cash resources are ample.

The corporation has four main classes of assets: (1) Fixed assets; (2) stocks of raw material, intermediates and colour; (3) investments and cash; (4) intangible assets. It is proposed to write down or write off considerable sums from the values placed upon three of these classes of assets. The reasons which determined your board to suggest to you the adoption of this course in regard to each class are stated in the memorandum, but I will slightly enlarge upon them. The first and most considerable writing off is from the valuation on the corporation's works, which were erected six years ago on far too large a scale and at far too great a cost. The error in judgment as to the scale of the works necessary is not peculiar to this corporation—it is an error into which other dye manufacturers fell; for to-day, throughout the world, dyemaking works, partly no doubt because their plant and machinery have been found useful for war purposes, exist on a scale greatly in excess of the requirements of the industries using colour. It can be confidently estimated that to-day the dyemaking capacity of the world is nearly three times the world's present requirements.

The exceptional cost of construction, as distinct from the excessive scale of the construction, was a handicap which your corporation suffered from in common with all traders who had to undertake capital expenditure on works, plant and machinery during or immediately after the war. In the case of this undertaking and its parent, such an expenditure was considered justified, not only because of the great national emergency existing during and immediately following the war, but because of the persistent pressure of dye users for the supply of particular dyestuffs. But its disastrous effect upon your corporation's capital position can be judged from the fact that though appropriations amounting to £2,366,000 have been set aside to meet depreciation on plant and machinery which has cost your corporation £5,325,000 during the past six years, your board considers it prudent that on reconstruction a further sum amounting to nearly £1,200,000 be written off. The new reduced value is, in the opinion of the board's experts and of the valuers who have been consulted, not in excess of the utility value of the plant at the present day after making all necessary allowances for redundancy and obsolescence.

The writing off of the sum £280,000 from the valuation of the stocks is a measure of prudence dictated by the further fall in prices. It is always difficult to make a true estimate of the value of a large stock of commodities whose prices are subject to considerable fluctuation and of which the amount by relation to the turnover is necessarily large, owing to its variety and the time it takes to manufacture, and that is the case with the stocks of your corporation, of which the selling prices are dependent, not only upon the competition of other manufacturers in this country, but upon the decision of the Licensing Committee, as to the price at which such commodities can be imported from abroad. After the proposed

writing down it is believed that the stocks will stand in the new balance sheet at a reasonable value, even making allowances for a possible further fall in prices.

Non-Tangible Assets

In regard to the proposed writing off of the preliminary expenses, I need only say that the entry as it stands in the balance sheet is not a true asset, and that such expenditure is invariably written off out of profits as speedily as practicable. If the corporation had made profits, undoubtedly that policy would have been adopted, but its financial results did not permit of this being done, and, having regard to the time which has elapsed since the corporation was formed, it is only prudent on reconstruction to relieve the profit and loss account from a debit in the future in respect of this item.

Goodwill might have been retained at a nominal value, but it would be anomalous for a corporation, not at the moment able to pay dividends and having an adverse balance of £360,000, to allow its goodwill to stand at any considerable sum in the balance sheet, and the board suggest that the whole of this item should be written off. Some portion of the £750,000 might have been retained with some justice as representing an estimated value of the corporation's patents and trade marks, but here again the board thought it prudent to strengthen the capital position by entirely eliminating this item. There is no need for me to explain the suggested writing off of the loss, which, like the preliminary expenses, is not a true asset. Fortunately, it is unnecessary to write down the value of the investments, or the debtors, which with the cash amount to £3,894,207, because the investments are practically all in Government securities and the debts are good—*i.e.*, the amount brought into the balance sheet is arrived at after making all necessary allowances for possible bad debts.

From the cash and investments there is deducted, as distinguished from being written off, the sum of £1,580,000, of which £600,000 is used to cancel £1,700,000 shares held by the Government, and of which £980,000 is used to pay the preference shareholders a part of their shareholding. The total of these amounts is £4,421,000, but I must emphasise that of this only £1,741,000 represents capital lost to the public, for the writing off of the Government shares of £1,700,000 in exchange for £600,000 provides a sum available for the purpose of writing down the assets of £1,100,000, and the cash (£980,000) returned to the preference shareholders releases an equivalent liability. It is not the fact, as has been stated, that the shareholders have lost £4,421,000; excluding the Government holding they have lost £1,741,000 out of a sharheolding capital of £7,497,000; that is bad enough, but it is under 24 per cent. of the whole.

This loss has to be fairly apportioned between the various classes of shareholders, and it may be well here to remind you of their respective rights. The preference shareholders have prior rights in regard to capital, as well as in regard to profits, although the latter are non-cumulative; the preferred ordinary share has preference over the deferred in regard to the distribution of profits, but none in regard to the distribution of assets, if the corporation were wound up.

Effect on Shareholding

Each shareholder naturally judges any scheme of reconstruction by the way in which it affects his own particular interests, and, in deciding whether he will give or withhold his sanction, asks himself whether the sacrifice demanded of him is in fair relation to that of other classes of shareholders. It is an accepted axiom that no man is a good judge in his own cause, but the board, who are not interested in any particular class of share to the exclusion of others, have endeavoured in formulating their scheme of reconstruction equitably to distribute the sacrifice which the various classes of shareholders must make towards the rehabilitation of the corporation's capital, Their judgment in this respect is supported by the judgment of the investing public, who, for some considerable time past, have priced the preference shares at a value of about 6s. in excess of the preferred ordinary shares. So far as I have been able to judge from consultation with several of the largest holders of shares, many of them holders of all three classes of shares, they are satisfied that the sacrifice required has been fairly apportioned.

To deal with the actual figures, the first main relief to the capital account is effected by the payment of £600,000 in cash to the Government for a shareholding of £1,700,000, already referred to as deducted from the assets. The second is that the preference shareholding is reduced by the sum of £980,000, equivalent to the cash repaid. The balance of the reduction in capital (£1,741,000) is effected by writing down the nominal value of the preferred and deferred ordinary shares, other than the Government holding, the former by one third and the latter by two thirds of their nominal value. The proposal that the deferred ordinary should suffer a double share of the loss is again confirmed by the market price of the relative shares. All the new shares rank equally. There is only one class of shares, and the sacrifice which the preference shareholder is asked to make to the common good is his consent to this equal ranking of shares.

In paragraph 9 of the scheme it is pointed out that there is at the present moment £802,888 unissued out of the total authorised capital of £10,000,000, and this would remain, and the total capital of the corporation would, therefore, be £5,578,468, if the changes in the issued capital, which I have indicated, were made, and no other action was taken; but it is possible that the future expansion of the corporation's activities may demand a larger capital than this sum; moreover, stamp duty has already been paid to the Government on a capital of £10,000,000. If the capital on reconstruction were confined to 5½ millions, then in the possible contingency of expansion of the corporation's activities, a further expense for stamp duty would again have to be met; accordingly the board propose that the authorised capital of the corporation shall remain as at present at £10,000,000 (of which £4,775,580 is issued) but they do not propose that they should be at liberty to issue an amount which would bring the issued capital in excess of £6,000,000 without the specific sanction of the shareholders.

I will not refer at any length to the amendments to the articles of association. These have been made in order to carry out the release of the corporation from the restrictions which now hamper it, and in so far as they are material, they are referred to in paragraph 14 of the scheme; they also carry into effect the proposed changes in the corporation's capital.

Difficulties of the Past

The memorandum which has been circulated by the board is very brief in regard to the future prospects of the corporation and I think that you may perhaps expect me to enlarge upon it. In the first place you will be aware that your management were given the task of setting up and making successful a most complicated industry of which a practical monopoly had been established, prior to the war, by manufacturers producing outside this country. There has not been too much time and the conditions have not been favourable for trying out a new industry, even if the corporation had not been hampered by its association with the Government and by the initial costs which it had to incur, and the constant fall in prices.

The final record of success or failure of any concern is, of course, found in its balance sheet, and for the last three and a half years the corporation's balance sheet has been unsatisfactory, while a struggle has been waged against the loss made in the year 1921—a loss of over £1,000,000—which would have been more than doubled if in that particular year over £1,000,000 had not been repaid in respect of excess profits duty. The adverse balance thus created has been gradually reduced to the sum of £360,000, at which it now stands in the balance sheet, and this has been effected concurrently with a fall of more than 50 per cent. in prices.

If the scheme, which is now before you, be accepted, the corporation will be in the position of having dissolved an association with the Government, which did not conduce to the corporation's prosperity, and the writing down of the assets will render it unnecessary for us to devote such a considerable annual sum in the future towards the depreciation of our plant and machinery. We shall be indeed in an exceptionally strong financial position, for there are very few companies which can show 35 per cent. of their assets in realisable investments and cash, with no loans or debentures, with debtors exceeding creditors by over £300,000; and with fixed assets and stock written down to realisable present values.

Economies and Improvements

We have effected, and are continuing to effect, improvements and economies in management, and the complaints as to

the quality of our productions are now very much rarer and we think much less justified, but we hope to eliminate entirely these complaints, and, in addition, to provide better and more efficient technical service. Our works costs have fallen very considerably during the past few months. We have in fact done our best to cut out the dead wood; but I do not pretend, nor do the board believe, that merely by the means already adopted can the corporation achieve success in the future. We have appointed Dr. E. F. Armstrong as managing director; he came to us from Joseph Crosfield and Sons' works at Warrington with very high credentials and equipped with a knowledge and experience of especial value to our undertaking, and I am sure that every shareholder will desire to be associated with the board in their expression of goodwill and encouragement which has been extended to him. We also are fortunate in having officers of exceptional skill, who are working valiantly and without any thought for themselves in their efforts to bring success to our undertaking. In addition, the board will avail themselves of every opportunity to strengthen the organisation and encourage a spirit of greater enterprise in the whole of our undertaking; but even so, all that we can do will not necessarily mean that we can make a profit out of the manufacture of dyestuffs. I doubt whether any large concern is making a profit out of the manufacture of colours to-day.

We recognise that in the business of making dyes we have to face a world competition, and that in order to succeed we must be able, ultimately, to sell at a world price. In such circumstances your board are of opinion that the scope of the corporation's activities should be widened in order fully to make use of its assets. Although the shareholders can be assured that this board will not embark on any rash or hazardous enterprise, they hope to utilise the resources, the equipment and the personnel of your undertaking in that wider range of activities which is now open under its proposed amended articles. I am not able to indicate in what direction our pursuit for this wider use of our resources will take us, but I think it well to mention the matter so that you might know that the board are not unmindful of the need for engaging in the manufacture of other products which will, without prejudice to our main business, bring increased income to our corporation.

Future Policy

I must not close without saying a word upon a matter which has been the subject of considerable controversy, not only in the Press and other places, but particularly among the colour users. I refer to the proposed agreement between the manufacturers of dyestuffs in Germany and your corporation. I took an active part in all the negotiations which began about four years ago, and which finally resulted in an agreement between the I.G. and your corporation, but unfortunately (and I use that word advisedly) it was subject to the approval of the Government. I will not occupy your time by a recital of the reasons which prompted the Government to exercise their power of veto, but content myself by saying that the fears of what would happen to our industry and to the interests of the colour users in this country if that agreement had been sanctioned were not well founded and nothing has transpired during the years which have elapsed to alter my views and those of my colleagues on the board. Whether an agreement between the I.G. interests and ourselves is now possible I am quite unable to say, but I should like to give this assurance, that whatever may happen in the future, the present board are prepared to give a definite pledge that while the management of the corporation is entrusted to their care it will not, as was alleged, be allowed to sink or to drift into the position of a mere distributing agency for dyestuffs, and that whatever agreement may be made, it will not be inimical to the interests of our customers, the colour users, but will be made with the object of securing for them the widest measure of freedom in the conduct of their business, and the opportunity, as far as lies in our power, to purchase their colours at the world's prices. The corporation will continue to be in the future what it has been in the past, a large manufacturing company whose aim will be to meet so far as its resources will allow and upon an ever-widening scale the needs of the colour users of this country and employing a large staff of skilled chemists that will continue to be an undoubted asset to our country in times of peace as well as of war.

I have tried without trespassing too far upon your time and patience to place before you the important points which I have thought you might wish to hear about, but there may be other matters which the shareholders might wish to mention, and I shall be glad, before formally moving the necessary resolutions, to answer questions which anybody may wish to ask. Finally, allow me to say that the scheme of reconstruction, the agreement with the Government and the new articles of association are submitted to you with the complete support of the whole board, who ask you to give them your approval.

The CHAIRMAN then moved, "That the scheme dated November 11, 1925, as printed and circulated to each shareholder, be and the same is hereby approved and adopted."

Sir WILLIAM ROBERTSON seconded the motion.

The Discussion

Mr. H. SUTCLIFFE SMITH supported the motion. He was glad that the company was proposing this very necessary financial reconstruction, which he, as chairman of the Colour Users' Association, had advocated persistently for the past four years. As representing a large firm with considerable holdings in the corporation, he was authorised by his colleagues to say that the scheme had their approval. He was glad to have Lord Ashfield's assurance that, so far as the present board were concerned, nothing would be done that in any way would debar the corporation from remaining a manufacturing entity, and he welcomed the chairman's promise that it would not be allowed to drift into a mere distribution agency.

Mr. H. P. GREG moved a number of amendments to the new articles of association, some of which had reference to the directorate of the corporation. He continued, amid interruption, to read lists of other companies on the boards of which the directors served; he referred also to the fact that several of them lived in the South of England and were not in as close touch with the business of the corporation as was desirable.

All the amendments he submitted were defeated.

Mr. LINDSAY moved, as an amendment, "That the scheme put forward by the directors be modified to the extent that the preference shares should retain their existing preferential rights.

Sir BERNARD GREENWELL and Major GILLAM supported the directors' proposals.

Mr. Lindsay's amendment was defeated on a show of hands, as was also a similar proposal by Mr. T. J. McKay.

The resolution approving the reconstruction scheme was carried by an overwhelming majority.

Separate meetings of the preference, preferred ordinary, and deferred ordinary shareholders were then held, at each of which a resolution approving the reconstruction scheme already passed by the extraordinary meeting was approved.

Re-election of Directors

The ordinary meeting was then resumed, and Sir HENRY BIRCHENOUGH moved and Sir WILLIAM ROBERTSON seconded, "That the Rt. Hon. Lord Ashfield, the Rt. Hon. Lord Colwyn, the Rt. Hon. Sir Alfred Mond, Mr. G. P. Norton, and Mr. E. F. Armstrong be and they are hereby re-elected directors of the company."

Mr. GREG moved as an amendment that, in addition to the gentlemen proposed, four other directors should be elected who were intimately connected with the concern. He was prepared, he said, to leave the election of those men to the existing board.

The CHAIRMAN said there could be no disagreement in principle with what was suggested, but he would ask, in view of the difficulties of finding the ideal director, that the matter should be left with the board. He was compelled to rule the amendment out of order on the ground that the necessary 14 days' notice had not been given.

The resolution re-electing the directors was then carried.

Major GILLAM moved, and Mr. HARRIS seconded, the reappointment of Messrs. Thomson McLintock and Co. as auditors, at a remuneration to be decided by the board.

This was carried, and a vote of thanks to the chairman, moved by Mr. H. Sutcliffe Smith and carried, concluded the meeting.

Sheffield Conference on Solid Smokeless Fuel

By P. Parrish, M.I.Chem.E., A.I.C.

THE conference on "Solid Smokeless Fuel," held in the Mappin Hall of the Sheffield University, on Friday, November 20, was of notable importance. Called primarily to discuss what has been termed the "Leeds Papers," and the winning papers in the coke competition recently organised by a gas journal, it possessed additional interest. The assessors of the competition were expected to be present, and several well-known experts had had assigned to them for discussion aspects of the subject of which they had made special study.

In the absence of Sir Arthur Duckham through illness, Sir Frederic Nathan, President of the Institution of Chemical Engineers, who was in the chair, explained that the conference met to consider the production on commercial lines of a solid smokeless fuel, suitable for manufacturing and domestic use, with the idea of ultimately eliminating the present wasteful method of burning raw coal.

In according a welcome to the delegates in the name of the industries of Sheffield, Sir Arthur Balfour remarked: "If we are to keep pace with other countries, and are to maintain or improve the standard of living, it can only be done by scientific research and by making more use of the resources we have." After Dr. Ripper had extended a welcome on behalf of the University, the technical fare was proceeded with.

Mr. W. B. Leech, representing the assessors of the competition, regretted the absence of a notable contribution from gas engineers, and expressed the hope that this was not due to any lack of interest. He regarded the production of solid smokeless fuel having satisfactory free-burning properties as of vital importance to the nation. Too long had coke been the Cinderella of the gas industry. The interest which had now been aroused was a hopeful sign. He affirmed that if coke of the required characteristics was to be produced, it would be necessary to blend coals. It would not pay to purchase washed coal. He looked to the chemists to give them the lead, as he was confident that the engineers would be able to do their part.

Dr. Lander's Contribution

Dr. Lander's contribution (read by Dr. Fishenden in his absence) developed many interesting considerations. Indeed, it was a résumé of the Leeds papers. Of the coal mined in this country only 20 per cent., he pointed out, was so treated as to yield by-products. The industries responsible for the latter were those producing coal gas and oven coke. The former carbonised annually 18 million tons, and the last named submitted to coking treatment 19 million tons per year. An adequate consideration of the problem was impossible on that occasion. The decision had been reached that the question of oil production and all that was involved in that connection should be reviewed at a subsequent conference. As regards the production of solid smokeless fuel, the carbonisation of coal at 600° C. was peculiarly interesting. With external heating the production of oil was greatly increased, and apart from the production of suitable fuel, 15 per cent. of the original weight of the coal was yielded as gas. With internal heating the oil yield was reduced. It must not be overlooked that special uses were being found for low temperature coke, but this method of treatment could not be considered to rest on a sound economic basis.

With high-temperature carbonisation, although its economic stability had been established for years, it was feared that the loss of volatile matter from the coke was bound to react on the ease of kindling, and this was a disability which must be surmounted.

The problem, therefore, resolved itself into this: Either a better quality of coke, more readily ignitible, and with improved free-burning properties, must be provided by the industries undertaking the carbonisation or coking of coal at high temperatures, or the economic difficulties of low-temperature carbonisation must be overcome. The inherent defects of gas coke were accentuated by (*a*) high water content, (*b*) high ash content, and (*c*) irregularity of size, due to the absence of grading. If regard was given to these considerations, without doubt a wide application for high-temperature coke would result.

Essential Qualities in Smokeless Fuel

Dr. Smith, in speaking of the qualities requisite in a solid smokeless fuel for domestic use, asserted that gas and metallurgical cokes were satisfactory for many purposes, such as central heating, small coke furnaces in industry, steam raising, producers, etc. Indeed, there was no necessity for an improvement of the quality, except for household needs. This view was later contested by Mr. Hollings, of the Gas Light and Coke Co. He apparently does not desire the two fuels—gas coke and metallurgical coke—to be associated, and does not hesitate to question the suitability of oven coke for central heating purposes, where small stoves are concerned.

Dr. Smith's view is that, having regard to the large amount of capital invested in gasworks and coke ovens, there is no necessity to establish an independent industry for the production of solid smokeless fuel. Technicians can, by suitable modifications of their existing plants, meet the demand as regards quality.

What is necessary in a really first-class smokeless fuel? Dr. Smith, without demur, answered his own question. The fuel should be (*a*) smokeless, (*b*) readily combustible, (*c*) readily ignitible, (*d*) low in moisture content, (*e*) not too high in ash content, (*f*) not too light or friable, and (*g*) no higher in price than satisfactory coal. He suggested that there was no adequate realisation as yet of the possibility of gas and coke oven cokes satisfying the particular need, and expressed the view that the demonstration of coke combustion, apparatus for which had been installed in an adjoining room under the direction of Mr. R. Halkett, the general manager of the Sheffield Gas Co., would give conviction to the most critical mind. Let it be remembered that the domestic consumer requires 40 million tons annually of suitable fuel, and that the combined production of the gas and coke oven industries is to-day only 16 to 18 million tons. What an opportunity for development!

High Temperature Fuel

The presentation of the case for the production of free-burning solid smokeless fuel at high temperatures was entrusted to Professor R. V. Wheeler, and when he prefaced his remarks by saying "My intention is to tell you how this can be done," it is not too much to say that every word was listened to with rapt attention.

The first line of thought, common to all, not original in any way, because reference to it can be found in Percy's "Metallurgy," was that an improvement of the quality of existing gas and oven cokes could be secured by the blending of dissimilar coals. "This underlying principle was based on experiment, largely on theory, and to a small degree on practice," Professor Wheeler observed. It is necessary to appreciate, therefore, that what he suggested was largely put forward as surmise, and not in any way dogmatically.

Coking coal undergoing carbonisation becomes molten, and forms a plastic layer. It is the presence of this plastic layer which greatly retards the transfer of heat. The theory of the production of smokeless fuel is that if one can obviate the formation of the plastic layer, more rapid concentration of heat can be secured, carbonisation can be pushed, and there will be a great through-put. Coking coals contain an excess of binding material over what is required. If the blending of non-coking and coking coals is resorted to, this excess will spread itself over the non-binding coal, and produce a coherent layer, and incidentally give a smokeless fuel. Accompanying the project of blending coals, there is the necessity for fine grinding of the coking coal of the blend. If the latter procedure is pursued, and there is satisfactory incorporation of the two qualities of coal, coke will result which can be ignited more readily, and which possesses better combustibility. As the foregoing suggestion was based on experimental work, it was imperative that a proper trial on a large scale should be made. There should be a systematic and scientific study. In the past there had been too little careful study. The need was not altogether met by the Fuel Research Station at East Greenwich.

Proceeding, Dr. Wheeler observed: "I will give you now, in brief, what is suggested as the most likely process to succeed."

A blend in suitable proportions of coking coal with that of the non-coking variety, or with breeze, should be carbonised (*a*) in narrower coke ovens, and (*b*) heated strongly, so as to attain rapid heat transfer, (*c*) The charge should be pushed as soon as a temperature of 750° C. has been attained by the centre of the charge, and (*d*), the coke should be suitably quenched. Finally, he invited information which had a practical bearing on the suggestion which had been made.

Combustibility of Coke

Mr. E. V. Evans discussed the combustibility and reactivity of coke. Many were striving, he said, to get to fundamentals. Coke, suitable for one type of reaction, might be unsuited to another. More information was necessary concerning the cause of reactivity. He urged the necessity for the standardisation of methods of test, as it was impossible to correlate the work of various investigators. Some were speaking in terms of one standard, others in terms of another. It was much more difficult to devise a test for combustibility than for reactivity, if the former term embraced the suitability of the fuel in an open grate. The usually adopted test failed because the oxygen concentration was reduced to such a low limit that the analytical examination of the products became difficult. Another method of determining combustibility, which his company had adopted, taught a good deal. He urged the industries concerned to go slowly. "If we are to replace raw coal in the household," Mr. Evans said, "something is required which is not only in every way equal to it, but is its superior."

The following took part in the discussion: Dr. Travers, Dr. Parker, Mrs. Cloudesley Brereton, Mr. John Roberts, Mr. Biddulph Smith, Mr. Harald Nielsen, Mr. Hollings, Mr. T, F. E. Rhead, and Mr. Armstrong.

Low Temperature Memorial Service

Probably the most significant contribution to the discussion came from Mr. Roberts, who, unlike Professor Wheeler, was dogmatic. He suggested that the conference served a double purpose. It was a memorial service to low temperature carbonisation, and the christening ceremony of high temperature methods. He affirmed that if the plastic layer could be eliminated, the problem would be solved. The advantages of the removal of the plastic layer were (*a*) swelling would be eliminated, (*b*) heat transmission facilitated, (*c*) temperature control afforded, (*d*) coking period reduced, (*e*) through-put increased, and (*g*) fuels other than coking coals could be converted into coke.

The removal of the plastic layer could be achieved by maintaining a maximum flue temperature, building the walls of the oven in silica, and making the width of the oven 14 ins. His suggestion was that the charge should be pushed when the core had reached a temperature of 600° C., which would represent a carbonisation temperature of 700 to 750° C. The duration of carbonisation would be 20 hours instead of 30. He was of opinion that gasworks having horizontal retorts or intermittent verticals could apply the system immediately. His suggestion was based on close study of the problem for a number of years. He finally observed that the coal which was required for blending with the coking variety could be obtained from the identical collieries supplying the coking coal.

Other interesting contributions to the discussion were made by Dr. Parker and Mr. Hollings, but limitations of space preclude reference to them.

There was a unanimity of opinion that with the present gasworks and oven coke, as indeed with the improved quality foreshadowed, (*a*) quenching would need to be effected more satisfactorily, and that (*b*) handling, screening, and breaking plants would be required.

These aspects were respectively dealt with by Mr. Douglas Rider and Mr. F. M. Birks. Dry quenching is preferable, if a use can be found for the steam resulting. Mr. Birks remarked that the effect of the material on the handling plant and similarly, of the plant on the material, must be the primary consideration. Coke did not afford the lubricating properties which coal did. An india-rubber belt conveyor is capable of handling large quantities gently. Shoots must be devised which admit of a minimum of impact to the coke. This was not difficult. Screening, he observed, was simple. The important considerations were (*a*) suitability of gauge, and (*b*) such motion must be imparted to the material as will effect a suitable separation. The common fault was overcrowding.

Co-operation between Gasworks and Coke Ovens

Following the treatment of these aspects a further discussion took place, in which Mr. Halkett, Mr. Hird, Mr. Chamberlain, and Mr. Jennings took part.

Mr. Chamberlain (chief engineer to the Sheffield Gas Co.) did not agree with the cleaning of coal at gasworks, nor with the idea that volatile matter should be left in the coke to promote more ready ignitibility. To sell volatile matter at 1½d. per therm was not a commercial proposition. He believed in coal blending and suggested that there should be co-operation between gasworks and coke ovens.

Professor Cobb, in opening the general discussion, urged the need for a fundamental investigation. Research was being carried out at Sheffield. They, at Leeds, were doing something of the kind. Investigations directed to determining different rates of heat transmission and the effect of blending were proceeding. It was hoped that the results would be of value. He urged the necessity for fresh methods of test, and emphasised the need for grading, and for greater care as regards the water and ash contents of gas coke.

Altogether, it was a valuable conference, and there was a consensus of opinion that a distinct service had been rendered to the high temperature carbonisation industries. One can perceive light emerging from darkness.

Barytes

To the Editor of THE CHEMICAL AGE.

SIR,—In THE CHEMICAL AGE of November 21 (p. 535, bottom of page) is an inquiry from a Yorkshire firm proposing to treat barytes. I can recommend several manufacturers of approved grinding plant, but the crux of the problem is not in the grinding, but in the economic bleaching of "off-colour" barytes. A lot of money may be lost if grinding plant is erected before the particular grade of barytes which it is proposed to treat has been subjected to the requisite tests.

The problem is one for a technician in electro-chemical bleaching. (There are also some bleaching processes which are purely chemical.) Britain used to have a monopoly in barytes products, but the ancient systems still in use by some parties in Britain can no longer yield good profits on account of overseas competition from modern plants. In your issue of September 26, 1925, you published a letter from myself on bleaching China Clay. Barytes can be bleached in just the same way and at about the same cost. If you will put the inquirer into communication with myself, I should be much obliged.—Yours, etc.,

Mandeville House, Isleworth, A. WORSLEY.

Fashionable Green Shades

THE latest colour samples received from the British Dyestuffs Corporation are a series intended to meet the present demand for fashionable green shades. Four of the patterns are produced on botany serge with Naphthalene Dark Green A as a base and are dyed with the addition of Glauber's salt and acetic acid. The remaining five are produced on carbonised velour cloth, and in this connection attention is drawn to Lissamine Dark Green ML, which, on account of its excellent levelling properties, is particularly suitable for this material. In dyeing velour an addition of Glauber's salt and sulphuric acid is recommended, provided that the material has been neutralised after carbonising. The acid present in cloth that has not been neutralised will probably be sufficient to exhaust the dyestuff, in which case an addition of Glauber's salt only would be necessary.

Synthetic Acetic Acid Production in Italy

THE present annual output of synthetic acetic acid in Italy is, according to reports, 2,500 tons, and will soon be increased. A company was formed after the war at Villadossola and will shortly also supply industrial acetic acid of about 96–97 per cent. These developments will greatly restrict imports.

The British Sulphate of Ammonia Industry

Mr. Milne Watson's Review of the Year

Following the annual report of the British Sulphate of Ammonia Federation, extracts from which were published in our last issue, the annual meeting of the Federation was held on Thursday, November 19, when Mr. D. Milne Watson, the chairman, reviewed in detail the work of the year.

In moving the adoption of the accounts, Mr. Milne Watson stated that the outstanding feature in the sulphate of ammonia market in the year under review had again been a large increase in consumption and a fall in price. The increase in consumption amounted to about 11 per cent. on last year's figures, and those figures were about 8 per cent. higher than during the previous year. While this increase in consumption was satisfactory in itself, it was regrettable that it had been secured at so heavy a sacrifice in price at a time when the other products of most of the manufacturers concerned were yielding very small, if any, returns. The report made it clear why they had not been able to secure a better price for sulphate of ammonia. The chief reason was that the output of nitrogen in the United Kingdom was only about one-tenth of the production of nitrogen in the world, excluding Chilian nitrate of soda. It was obvious, therefore, that they could only have a small voice in fixing the general level of price. Prices during the past year had been fixed chiefly in relation to the internal price of nitrogen for home consumption in Germany.

Under present conditions Germany was forced to make every effort to avoid importing food, and she could only succeed by providing her farmers with abundant and cheap nitrogen. As the total quantity of nitrogen consumed in Germany for agricultural purposes was about one-third of the total consumption of nitrogen in the world, it was obvious that the price fixed for home consumption in Germany must have a determining effect on the price of nitrogen in all other countries.

The Price-Fixing Policy

If they were unable to influence the general level of nitrogen prices, their output was sufficiently large in itself to make it absolutely necessary that the selling should be in the hands of one central body like the Federation. If the Federation did not exist there would be constant and large fluctuations in the price of British sulphate of ammonia. Experience had shown that these fluctuations were bad alike for the consumer and the maker, and that the largest consumption was always secured if prices were fixed at a reasonable level and maintained thereat, so that consumers could purchase their requirements in advance with confidence.

This method of fixing prices had for some years been adopted by the makers of nitrate soda in Chile, and the large groups of Continental producers of sulphate of ammonia and other forms of nitrogen were now pursuing a similar policy. In this way far greater stability had been secured in the nitrogen market than was possible in former years and he attributed a portion, at any rate, of the increase in consumption to that fact. Consumers were not suffering by this stabilising process because the prices for sulphate of ammonia had shown a steady decrease from 1920 onwards.

In 1920 the price of sulphate to farmers in this country was £23 11s. per ton. For the year under review it was on an average about £14 10s. per ton; for the current season it was about £13 per ton. Farmers did not realise how cheap sulphate of ammonia in particular and nitrogen in general was to-day compared with practically all agricultural products. While sulphate prices were on a pre-war level, the prices for nearly all other commodities were 50 to 100 per cent. over the pre-war figure. There was room for a very much larger consumption of nitrogen in this country. With an arable acreage of just under 14 million acres Great Britain last year consumed about 35,500 tons of pure nitrogen, of which 27,300 tons was in the form of sulphate of ammonia. That represented a consumption of nearly 6 lb. of pure nitrogen per arable acre.

Larger Consumption at Home and Abroad

Germany last season used 11 lb. of pure nitrogen per acre of arable land and there was every indication that this quantity would be largely increased during the present season. The British figure represented a considerable improvement on the total consumption during the last few years, for during 1921 only about the same total quantity of nitrogen was consumed with an arable acreage of nearly one million acres more. During the four years the increase had amounted to 1¼ lb. of nitrogen per arable acre. This was fairly satisfactory, although they still had enormous leeway to make up before consumption reached the level attained in Germany. But recent experiments seemed to indicate that there was a very large field for the increase of nitrogen in this country on grassland. There are at present 16¼ millions acres under grass in Great Britain partly permanent pasture and partly meadowland. If only one-quarter of the grassland were dressed with nitrogen at the same average rate as the arable land a new market for over 10,000 tons of pure nitrogen per annum would be opened up. It had been known for many years that in the early stage of their growth grasses were very rich in albuminoids or protein nitrogen, and young green grass was more nutritious than clover under certain conditions. If advantage could be taken of this fact an enormous increase could be effected in the production of milk and meat from a given area of land.

The German experiments at Hohenheim were designed to ascertain whether a larger production of milk could be obtained from medium quality grassland, at a profit, by applying nitrogen in the form of artificial manures. No less than 107 lb. of pure nitrogen, equivalent to an annual application of 5 cwts. of sulphate of ammonia per acre, were used in these experiments. Quite apart from the average daily yield of milk from each cow, the total quantity of milk produced in 150 days from the grazing of one acre of grassland was increased from 193 gallons in 1916 to 518 gallons in 1922. In other words, where one gallon of milk was produced from a given area at the beginning of the experiment, the quantity rose to 2·68 gallons at the end. The Federation had succeeded in interesting the Ministry of Agriculture, several of the agricultural colleges here, and also a number of private farmers in this remarkable demonstration, and a series of experiments had already been arranged for in various parts of the country.

While the prospects for an increase in the consumption of sulphate of ammonia at home were encouraging, it was in the tropics that their most successful effort had lain during the past year. The progress made had been extraordinarily rapid, and whereas a few years ago practically the whole of the Indian production was being exported in Java, last year, a quantity equal to over 90 per cent. of the Indian production was consumed in that country, and a large part of the 12,500 tons of sulphate of ammonia used on Indian soil was used for crops, and in districts in which it was practically unknown before. Out of this total a quantity of about 2,000 tons had been sold in very small lots to Indian cultivators in the villages, and therefore represented a particularly valuable effort from a propaganda point of view which they hoped would lead to a very large increase in the use during the coming year. Up to the time of the recent political disturbance they were also making very satisfactory progress in China, and there was every hope that the Chinese market would in future provide a very valuable outlet for increasing production.

Small Overhead Charges

Dealing with overhead charges, the CHAIRMAN stated that the total cost of carrying on the Federation, including interest charges, legal charges, income-tax, and all other items was 3s. 5d. per ton sold, or a fraction over 1 per cent. of the net return to members. They could fairly claim that the Federation had made satisfactory progress during the past year, and the slight increase in membership showed this view to be shared by makers of sulphate of ammonia who had not yet experienced the advantages of membership.

On the motion of the chairman, seconded by Mr. S. Henshaw, (Staffordshire Chemical Co. (1917)), the report and accounts were adopted.

The resolution to reappoint Thomson McLintock and Co. as auditors was proposed by Mr. J. W. Hazel (Tinsley Park Colliery Co.) and seconded by Mr. T. H. Poulson (Stafford Corporation) and carried unanimously.

On the motion of Mr. A. Read (Bolckow, Vaughan and Co.), seconded by Mr. W. Phillips (Luton Gas Co.), the meeting then unanimously re-elected Mr. D. Milne Watson (the Gas Light and Coke Co.) chairman, and Mr. E. J. George (Consett Iron Co.) and Mr. S. Henshaw (Staffordshire Chemical Co.) vice-chairmen for the ensuing year.

Votes of thanks to the Propaganda Committee and the staff having been carried, Mr. A. Stanley (Simon-Carves, Ltd.) replied on behalf of the Propaganda Committee and the general manager, Mr. F. C. O. Speyer, on behalf of the staff.

The proceedings terminated with a vote of thanks to the chairman.

Patent Law as it Affects the Dye Trade

Dr. Ehrhardt's Address to the Dyers' Company

THE second of the series of lectures arranged by the Dyers Co. was given at the Dyers' Hall, London, on Thursday, November 19, when Dr. E. F. Ehrhardt gave an address on "Patent Law as it Affects Dye Makers and Dye Users."

In recent years, it was pointed out, there had been a reversion to the old view that letters patent were granted not merely to reward inventors, but also for the purpose of bringing about the introduction of new industries into this country, and since 1919 the law had been exactly as it should. The complaints of manufacturers now were with respect to the practice rather than to the wording of the law. A manufacturer in this country who was convinced that a patent granted over here was not being carried out was set the task of proving a negative—that the patent was not being worked over here. This was a most difficult thing to do, sometimes impossible. When a reputable applicant stated his condition that some patent was not being worked in this country the onus should be shifted, and there should be a duty on the patentee to declare exactly what was being done in that respect.

With regard to patents being granted in order to encourage manufacture in the country, and not merely for the reward of inventors, the lecturer suggested that this fact should be emphasised by wording on the application form that inventors and applicants signed when they applied for a patent. In the present application form the inventors, and any other applicants that joined with them, merely stated that they were in possession of an invention, of which they named the inventor, and asked for a patent to be granted to them. Further, it was logical that if patents were granted for the introduction of a new industry into the country, that, failing this new industry being introduced, there should be a lapse or revision of the grant for lack of consideration. There would, of course, have to be an inquiry in every case. To-day, if a manufacturer in this country saw that some patent was not being worked he might make an arrangement for starting to work it. This would involve experimental work first of all to see whether it was a really feasible thing to do. After the preliminary work he would produce the patent with a request for a licence, and on that being refused would go to the Patent Office. But the moment a patentee who was not manufacturing in this country learned that his monopoly was threatened, he made arrangements to manufacture in this country; and by the time the proceedings in the Patent Office took place the manufacture was going on. Dr. Ehrhardt submitted that death-bed repentances of this kind should not be tolerated.

Coming to a more radical change, the patentee, he said, should be able to obtain from the Patent Office a certificate of validity of his patent, and after this was obtained the validity should be no longer questionable. No change should be made in granting a specification, but when the fifth year's fee became due, it should be possible for the patentee to apply to the Patent Office for further investigation with reference to the validity of the patent. By waiting for the fifth year unnecessary work on the vast majority of patents—which lapsed at that time—would be eliminated.

Another point was that applications by rival inventors should be permitted without prejudice to their position. The commonest cases of alleged infringement between rival inventors were when A made an invention and patented it and B made another invention and patented that. Then A alleged that B's invention was an infringement of A's patent. From that moment both A and B were compelled to have a small staff of chemists working on the controversy, attacking their opponent's patent and defending their own. Research by several persons had to be directed to establishing differences or similarity between the position of A and B. Of course, besides the chemists, lawyers were set to work. Both sides consulted counsel and found opinions varying between the two extremes which he might call the Heath *v.* Unwin doctrine and the finger-post theory. In the old case of Heath *v.* Unwin the inventor had found that manganese steel could be prepared by adding carbide of manganese to the molten steel in the crucible. The alleged infringement took, instead of the carbide of manganese, a mixture of manganese ore and tarry matter. This was added, and in the molten steel some carbide of manganese was formed, and the manganese steel was obtained. It was held that the substitution of the cheap mixture of manganese ore and tarry matter was not an infringement of the use of the expensive specially manufactured carbide of manganese. No one could have seen that the cheap mixture would be equally effective. But this case, said Dr. Ehrhardt, was not now fully trusted. Some held the view that the Court would not go so far to-day, and, as the other extreme, a theory was put forward that if a patented invention acted as a finger-post to a later inventor, the latter must pay tribute to the earlier patentee. But how were the rival inventors to avoid the expense of the struggle? The only way was by reasonableness, compromise and agreement. Each should bear in mind that there was something to be said for both the doctrines cited. Something might be done by a slight simplification and amendment of compulsory licence practice directed to bringing about such agreement. The application for compulsory licences should be so amended that in the case of rival inventions, the later inventor could put in an application for a licence without any prejudice to his position. At present if the later inventor applied for a licence under the earlier patent that would be taken as an admission that his invention infringed the previous patent. Such a provision as suggested, said Dr. Ehrhardt, would bring about a number of reasonable arrangements. Its existence on the Statute Book would be effective, even though apparently a dead letter, never being used, because reasonable arrangements would come about without its being called upon.

Summarising the changes he proposed, the lecturer said that the first was a slight amendment in the application form, so that applicants for patents should be made to declare their intention to introduce a new industry into the country. Secondly, with reference to compulsory licences, he suggested three changes: (*a*) it should be the duty of the patentee, in certain circumstances, to state the facts as to the manufacture in this country; (*b*) death-bed repentances should be ineffective as a defence to an application for a compulsory licence; (*c*) application for compulsory licences by rival inventors should be permitted without prejudice to their position; and, (*d*) certificates of validity should be obtainable at the Patent Office.

Marking Ink for Chemical Porcelain

PORCELAIN dishes are in such wide use in chemical laboratories that the need for a marking ink for porcelain ware has long been felt. An ink for this purpose is described in the official journal of the American Chemical Society, *Industrial and Engineering Chemistry*, the formula of which was supplied by the Coors Porcelain Co., of Golden, Colorado. It is surprising that so many chemists, for want of such a marking medium, have been obliged to rely on the old-fashioned methods of denoting the contents of vessels either with adhesive labels, a process that involves trouble in renewing them every time the dish is used, or by placing the dishes on sheets of paper on which the necessary title is written, which often results in mistakes when the dishes are moved about. The formula and preparation of the marking ink quoted above is as follows: Grind together thoroughly 18·8 gm. of cobalt oxide, black commercial, and 1·2 gm. bismuth subnitrate, with 15 cc. of turpentine and 15 drops of Dresden thick oil.

From Week to Week

THREE MEN WERE SERIOUSLY INJURED by a fall of superphosphate at the chemical works of J. and J. Cunningham, Leith, last week.

A FRENCH TENDER FOR CEMENT at 39s. per ton is to be accepted by Middlesbrough Corporation. The British tender was 50s. 2d. per ton.

TWO NEW NAMES FOR ARTIFICIAL SILK are advocated by correspondents of the *Times*—"Lampros," and "Silvan Thread" or "Silvan Yarn."

THE GRASSELLI MEDAL has been awarded and will be presented to Dr. E. R. Berry, of Lynn, Mass., on December 4 for his paper on "Manufacturing Uses of Fused Clear Quartz."

BECAUSE of the small attendance, the meeting of the Liverpool Section of the Society of Chemical Industry on Friday, November 20, was adjourned *sine die*. The programme arranged was a discussion on "Chemical Journals and Chemical Societies," to be led by Dr. Holt.

DR. S. GLASSTONE, of Exeter, addressed the members of the Bristol and South-Western Counties Section of the Institute of Chemistry on Thursday, November 19, on "The Measurement of Over Voltage." Messrs. J. S. Thompson and W. R. P. Hodgson, both of Exeter, were admitted associates of the Institute.

A FUSION between the Baden Anilin and Soda Co., of Ludwigshafen, and the Aniline Factory Co., of Berlin, has been agreed at a meeting of the latter concern, according to Berlin reports. The property of the Afga Co., valued at 63,760,000 marks, will be allotted to the Badische Co. Production capacity is stated to have increased, but sales possibilities are only half pre-war dimensions.

FOR SELLING APPLES CONTAINING ARSENIC R. Buckingham, Ltd., Finchley Road, London, were fined 20s. with costs at Hampstead on Wednesday. They were American apples, and it was stated the pests there necessitated three sprayings, whereas English fruit needed only one spraying at blossom time. The arsenic had not washed off because of the dry season. Experts have stated that if the lead arsenate preparation is used when the apples are very small the fruit is perfectly safe.

TO ASSIST those wishing to avail themselves readily of official statistical information, the Permanent Consultative Committee on Official Statistics prepares an annual Guide to Current Official Statistics, volume three of which has just been issued by H.M. Stationery Office, price 1s. With its aid the inquirer is immediately directed to all current official publications that contain statistics bearing on his subject, and especially is made aware of the nature of the statistics he will find in the volumes to which he is referred.

FIRE DAMAGE and explosions are reported from several quarters. On Friday, November 20, a serious fire broke out at Toulon arsenal and the damage is estimated at £40,000. New plant was destroyed and the lead casing department was burned out.—Two men have died as the result of an explosion at Preston Dock on Thursday, November 20, when petrol was being pumped from a petrol ship into the tanks of the National Oil Fuel Co. Practically the whole load had been emptied when the explosion occurred, and the cause is still unknown.

THE NEW SULPHURIC ACID works of the Mond Nickel Co., Coniston, Ont., have been completed and are now in successful operation. This plant is designed on the latest and most approved lines, using the contact process, and the product is of the highest commercial quality. All strengths of acid will be produced, including oleum. This is the first successful effort to save the waste sulphur in the Sudbury district, and owing to the lower production cost it is expected that the consumption of sulphuric acid will be stimulated in Canada.

TWELVE MONTHS' IMPRISONMENT in the second division was passed at Manchester Assizes on Thursday, November 19, on Walter Whittaker (37), managing director of Rolston and Abbot, Ltd., chemical agents, Manchester, for frauds upon the Inland Revenue by making false returns and concealing profits. By this means, the prosecution stated, Whittaker escaped £11,000 of taxation. Counsel's plea for the defence was that Whittaker's sudden change from a wage of £2 10s. a week to a position of managing director handling large sums of money, "upset his outlook on the proportion of things."

A VERY FAVOURABLE OUTLOOK was indicated by Sir Robert Harvey, speaking at the annual meeting of the Liverpool Nitrate Company on Thursday, November 19. During the year, he said, the company had been producing iodine on a much larger scale with very good results, and further demands were anticipated in this direction. In 1924 more nitrate was produced than the sales for that year absorbed, which was the reason why Oficinas San Lorenzo and Carmen Barjo had now been closed down. They were justified in expecting that Oficina Mapocho would be working in March, if not earlier, but that did not eventuate. Sir R. Harvey was re-elected a director.

LT.-COLONEL R. M. PRESTON has been elected a director of the Rio Tinto Co., Ltd.

MR. ALFRED LOEWENSTEIN has been elected chairman of the Cellulose Holdings and Investment Co.

SIR ERNEST RUTHERFORD is to receive the honorary degree of Doctor at the Sorbonne to-day (Saturday).

MEMBERS OF THE COAL INQUIRY COMMISSION inspected the work at the Government Fuel Research Station at Greenwich on Friday, November 20.

VAST DEPOSITS OF PLATINUM in the Lydenburg and Tweefontein districts of the Transvaal are reported by Sir R. Kotse, Government Mining Engineer in South Africa.

THE SPANISH NITROGEN INDUSTRY is to receive substantial State aid in the form of an advance of 3 million pesetas to the Sociedad Ibérica del Nitrógene to develop production.

UNEMPLOYED insured workers in the chemical, etc., industry during October totalled 9,537—8,528 men and 1,009 women. This represents a very slight increase on the previous month.

THE NOBEL PRIZE IN CHEMISTRY is not to be awarded for 1925. As the 1924 prize was also held over, the money allotted has now been assigned to the reserve fund of the chemical section of the Nobel Institute.

THE STREATFEILD MEMORIAL LECTURE will be delivered on Thursday, December 3, at the Finsbury Technical College by Mr. F. H. Carr, F.I.C., director of British Drug Houses, Ltd., at 4 p.m. Sir William Pope will preside.

NO LESS THAN 29 CASES of lead poisoning were reported during October, including five in lead works and five in pottery works. Two cases of arsenical poisoning and four of aniline poisoning were also recorded for the month.

AN INQUIRY INTO THE COST OF DYESTUFFS in the textile industry has been ordered by the U.S. Tariff Commission, and Dr. W. N. Watson, colour specialist of the Chemical Division of the Commission, is to visit 25 textile mills and dye plants.

TO MANUFACTURE SYNTHETIC AMMONIA, a new company, Lazote, Inc., has been organised by the Du Pont Co., and a plant is to be erected at Belle, W. Va., with a daily capacity of 25 tons of anhydrous ammonia. It will be in operation by February.

SIR MAX MUSPRATT, Mr. R. G. Perry, director of the National Smelting Co., and Colonel R. L. Norrington, chemical manufacturer, of Plymouth, are on the board of a new company, the Western Viscose Artificial Co., Ltd., which has purchased premises at Bristol. The capital of the company, it is stated, will be £400,000 and a prospectus is expected to be issued shortly.

THE SUMMONS WAS DISMISSED on Friday, November 20, at Tower Bridge Court, when T. Janes, chemical worker, of Stepney, was charged with assault against J. Richards, warehouseman, of Rotherhithe. Both men had been employed by Robert Blackie, manufacturing chemist, of Tower Bridge Road, and in the recent strike at the works (reported in THE CHEMICAL AGE) Richards had been acting as a picket when, it was alleged, Janes struck him.

A REPORT OF THE SURVEY carried out by the Geological Committee of the potash salt deposits in the Perm district showed that, according to Moscow reports, at a depth of 92 metres a shaft sunk arrived at salts consisting of potassium chloride and sodium chloride. The percentage of potassium chloride was 22 as against 12 to 16 in Germany. This discovery of potash salts is of great importance, more particularly as up to the present the chief source of potash salts has been the potash obtained from sunflowers.

THE POLARISATION MICROSCOPE was the subject of an address by Mr. F. Young to the chemistry section of the Leicester Literary and Philosophical Society on Wednesday, November 18. He explained the nature of polarised light, using mica and tourmaline, and the causes underlying the phenomenon were outlined. The behaviour of crystals when examined by a beam of polarised light, was demonstrated by experiments. An illustration of the method of analysis of thin sections of rocks, by means of the polarisation microscope and throwing an image of the constituent crystals upon a screen, was also demonstrated.

PROFESSOR J. W. COBB, speaking on "Motor Spirit" at a club function on Monday at Leeds, said that about 2 gallons of benzole could be obtained from a ton of coal carbonised, and it would be of great national advantage if more gasworks washed out benzole. There should be no exaggerated idea of quantity, because if all the 34 million tons of coal carbonised yielded benzole there would only be about 74 million gallons, whereas the motor spirit used was roughly estimated at 500 million gallons. Alcohol could be produced from the proper treatment of many kinds of vegetation—potatoes, grain. At present we were living on a fuel capital and producing practically nothing at all.

Obituary

ALDERMAN R. W. ODDY, F.I.C., F.C.S., analytical chemist, of Rochdale, on Tuesday, after a long illness, aged 74 years. He took a prominent part in all phases of public life.

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Patent Literature

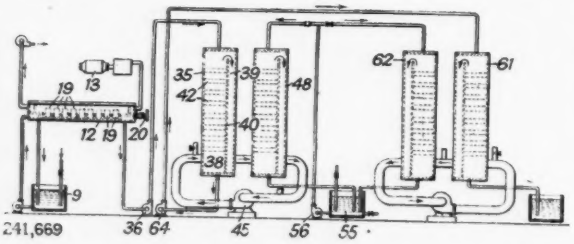
The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

241,669. Recovering Cyanogen from Solutions. L. D. Mills and T. B. Crowe, Palo Alto, Santa Clara Co., Cal., U.S.A. Application date, September 3, 1924.

The process is for recovering cyanogen from solutions employed in cyaniding processes so that they may be used again. The solution is first acidified, preferably by passing a current of sulphur dioxide through it, and then finely divided in the presence of a large volume of air which takes up the hydrogen cyanide gas. The latter may then be absorbed in a suitable alkaline solution by passing the air through the finely divided solution. By the use of a relatively large volume of air under a slight vacuum the danger due to the poisonous nature of hydrogen cyanide is avoided.

The solution containing the cyanogen compounds is pumped from the tank 9 to a chamber 12, where it is acidified by means of sulphur dioxide gas obtained by burning sulphur in the burner 13. The solution in the chamber 12 is divided into



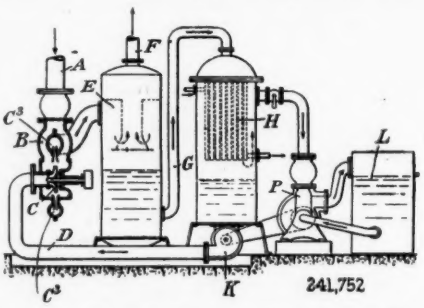
small particles by a series of rotors 19, mounted on a horizontal shaft 20. Each rotor carries longitudinally disposed beating bars, and each is placed in a separate compartment. The acidified solution is transferred by a pump 36 to a chamber 35, divided into two compartments by a partition 40. The compartment 38 contains a series of horizontal grids 42, over which the solution trickles. A large volume of air supplied by the fan 45 passes upwards through the chamber and extracts the hydrogen cyanide from the solution. The air passes downwards through the compartment 39 into the absorber 48 of similar construction, where it is treated with an alkaline solution supplied to the top of the absorber from a tank 55 by a pump 56. The liquid collecting in the bottom of the chamber 35 may be withdrawn by a pump 64 and delivered to a second chamber 61, where it is subjected to a further treatment with air. The air from this chamber is then treated with alkali in an absorber 62. The air is circulated in a closed cycle, and is under a slight vacuum.

241,682. Removing Phenol and/or its Homologues from Liquids such as Waste Waters. P. Preiss, 20, Stoppenberger-Strasse Katernberg, near Essen, Germany. Application date, September 19, 1924.

Phenols, etc., are removed from waste liquids by bringing the liquid into contact with vapour of a solvent, preferably trichlorethylene. The liquid under treatment must first be rendered neutral or slightly acid. The solvent is vaporised in a still, and passed into the top of a tower into which the liquid to be treated is sprayed. The solvent vapour takes up the phenol, and condenses in the bottom of the tower, where it is separated from the liquid. The solution containing phenol is returned to the still, and the solvent distilled off again. If the solvent has a higher boiling point than phenol or its homologues, a fractional separation is effected before the solvent is vaporised again.

241,752. Separation of Vapours by Absorption, Process for. P. C. Lemale, 2, Rue d'Amsterdam, Paris. Application date, December 19, 1924.

The process is suitable for separating benzol from gas, and alcohol from water. A mixture of alcohol and water vapour, or gas containing benzol, is supplied through a pipe A to a mixing chamber B, which contains a centrifugal pump C into which an absorbent liquid is fed through a pipe D. The pump produces a vacuum and atomises the liquid, which is intimately mixed with the vapour. The liquid absorbs the required fraction from the vapour and passes into an annular

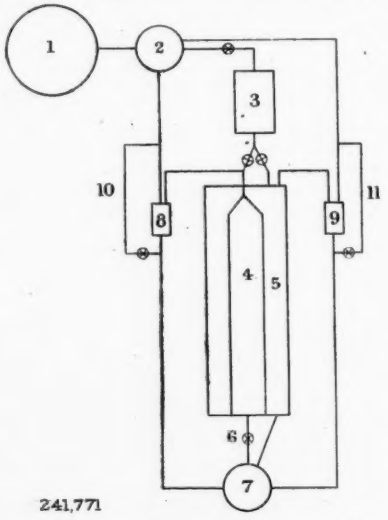


offtake member C^3, and thence to a separator E at atmospheric pressure. The absorbent liquid passes through a pipe G to a distilling apparatus H, in which the absorbed vapour is evaporated off. The absorbent liquid is returned by a pump K through the pipe D to the centrifugal pump. The evaporated benzol passes on to the condenser P and tank L.

241,767. Alkamine Esters of N-Substituted Para-amino-Benzoic Acid, Manufacture of. O. Y. Imray, London. From Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. Application date, January 15, 1925.

These alkamine esters are obtained by substituting in para-amino-benzoic acid in any desired order an alkamine residue for the hydrogen atom of the carboxyl group, and an alkyl or an alkyloxy alkyl residue containing more than two carbon atoms for a hydrogen atom of the amino group. These alkamine esters can be converted into their salts. A number of examples are given.

241,771. Catalytic Synthesis of Ammonia. S. G. S. Dicker, London. From H. Harter, 8, Theresienstrasse, Wurzberg, Germany, and A. T. Otto, 18, East 41st Street, New York. Application date, January 21, 1925.



In the catalytic synthesis of ammonia at pressures between 400 and 2,000 atmospheres, high ammonia concentrations are obtained, but difficulties are experienced in the removal of the heat generated, and this heat cannot be used in the synthesis

of ammonia itself. In the synthesis of ammonia at pressures below 400 atmospheres the ammonia concentration is low and its separation is uneconomical. In the present invention these two processes are combined, part of the nitrogen-hydrogen mixture being combined below 400 atmospheres and the remainder above, the ammonia being separated from the mixed gaseous products by condensation.

The nitrogen-hydrogen mixture passes from a vessel 1 to a water trap 2 and compressor 3. The gases are partly compressed in a high pressure tube 4, and partly in a low pressure tube 5, where they are subjected to catalysis. The products from the tube 4 pass through an expansion valve 6 to a liquefier 7, to which the products from the tube 5 pass direct. The uncondensed gases pass back through the tube 8 to the high pressure tube 4, or through the pump 9 to the low pressure tube 5, or the gas may pass through by-pass pipes 10, 11 to the pump 3. The heat of reaction generated in the tube 4 is transmitted to the tube 5, and the pressure on the walls of the tube 4 is relieved by the amount of external pressure. The catalyst and the velocity of the gas in the tube 4 are chosen so that the heat liberated is sufficient to raise the catalyst in the tube 5 to the necessary temperature. The ammonia from both tubes can be condensed by the cooling due to expansion of the high pressure gas. The residue of gas may contain 6 per cent. of ammonia, and is returned to the reaction chambers. The combined high and low pressure apparatus can also be connected in series, and may be connected in batteries.

241,795. Lithopone, Manufacture of. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. Application date, March 27, 1925.

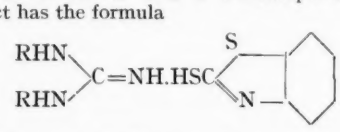
The object is to improve the manufacture of lithopone by obtaining a more uniform heating of the dried crude lithopone than can be obtained in muffles. The lithopone is passed through a rotary furnace in which it is heated by combustion gases travelling in the opposite direction. The gases are obtained by the combustion of water gas with the necessary quantity of air, the temperature being only slightly above that to which the lithopone is to be heated. The gases should be free from oxygen and dust. The lithopone is slowly heated over a long period, and is then quenched in water.

241,817. Catalytic Synthesis of Ammonia. Synthetic Ammonia and Nitrates, Ltd., and F. H. Bramwell, Billingham, Stockton-on-Tees, Durham. Application date, May 4, 1925.

The catalyst chamber is surrounded by a heat interchanger in the form of two co-axial tubes wound into two helical coils. The incoming cold gases flow through the annular tube, and the hot gases from the catalyst chamber flow through the inner tube. These tubes are embedded in asbestos, and a considerable temperature gradient exists between the wall of the catalyst chamber and the outer pressure-resisting vessel. The temperature of the latter does not exceed 100° C., and it may therefore be made of mild steel.

241,838. Vulcanisation of Rubber and Similar Vulcanisable Materials, Process for. Dovan Chemical Corporation, 30, Church Street, New York. Assignees of M. L. Weiss, 347, Chadwick Avenue, Newark, N.J., U.S.A. International Convention date, February 7, 1925.

This process is for producing an accelerator of vulcanisation which operates at a lower temperature, or in a shorter time, or both. The accelerator is a reaction product of a guanidine preferably disubstituted and a 1-mercapto-benzo-thiazole. This product has the formula



in which R may be hydrogen, when the reaction product would be obtained by the use of guanidine unsubstituted, or R may represent radicles such as the aromatic radicles, including phenyl, tolyl, xylyl, cumyl and naphthyl, or combinations of these such as phenyl-tolyl, or tolyl-cumyl. In an example, a rubber mixture consists of rubber 100 parts, zinc oxide 1 part, sulphur 2 parts, and 0·5 part of the reaction product of diphenyl-guanidine and 1-mercapto-benzo-thiazole. The mixture is vulcanised at 20 lb. per square inch steam pressure.

240,420. Sulpho-Cyano Derivatives, Manufacture of. Akt.-Ges. für Anilin Fabrikation, Treptow, Berlin. International Convention date, September 24, 1924.

These derivatives are obtained by the reaction of a solution containing a reaction product obtained from a halide of sulphuric acid and a sulpho-cyanide, with an amino or an oxyaryl compound. In an example, lead sulpho-cyanide is treated with a solution of sulphuryl chloride in carbon tetrachloride. The lead chloride and excess of sulpho-cyanide are filtered off, leaving a solution containing a compound which is probably sulphuryl sulpho-cyanide. This readily decomposes into thiocyanogen and sulphurous acid.

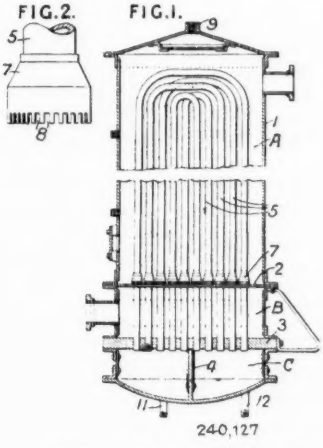
Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 219,971 (A. F. Meyerhofer), relating to soluble carbonates or hydroxides from insoluble carbonates, oxides or hydroxides, see Vol. XI, p. 353; 219,983 (Naamlooze Vennootschap Philips' Gloeilampenfabrieken), relating to separation of hafnium and zirconium, see Vol. XI, p. 353; 220,303 (Soc. of Chemical Industry in Basle), relating to new dyestuffs, see Vol. XI, p. 380; 220,649 (Synthetic Ammonia and Nitrates, Ltd.), relating to catalytic production of hydrogen, see Vol. XI, p. 428; 230,457 (Farbenfabriken vorm. F. Bayer and Co.), relating to manufacture of *w*-aminoalkyl substituted amino-naphthalene sulphonic acids, see Vol. XII, p. 508; 226,490 (A. F. Meyerhofer), relating to production of salts of complex hydrofluoric acids, see Vol. XII, p. 184; 231,512 (P. Pfeiffer), relating to a new compound from diethylbarbituric acid and 4-dimethylamino-2:3-dimethyl-1-phenyl-5-pyrazolone, see Vol. XII, p. 590; 231,840 (Sinclair Refining Co.), relating to oil-cracking stills, see Vol. XII, p. 591; 234,518 (Deutsche Gasgluhlicht Auer-Ges.), relating to manufacture of titanic acid, see Vol. XIII, p. 133; 237,591 (Ketoid Co.), relating to manufacture of cellulose acetate, see Vol. XIII, p. 334.

International Specifications not yet Accepted

240,126–7. Revivifying Active Material. A. A. Backhaus, 638, 5th Avenue, Rognel Heights, Baltimore, U.S.A. International Convention date, September 17, 1924.

240,126. Activated charcoal is revivified by passing steam through it, while steam is also circulated through pipes embedded in it. The charcoal is then dried by passing air, nitrogen or carbon dioxide through it at 50°–150° C., and cold water is finally circulated through the pipes.

240,127. This is an apparatus for carrying out the above process. A vessel 1 is divided into three compartments A, B, C by partitions 2, 3, and the compartment C is again



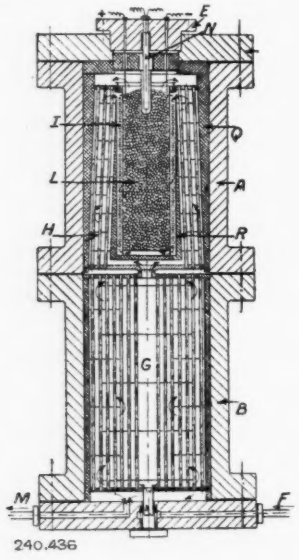
240,127

divided by a partition 4 forming inlet and outlet chambers for the heating or cooling medium supplied to the pipes 5. The charcoal is supported on the plate 2, which is perforated to permit the passage of the pipes 5. Hoods 7 with notched lower edges 8 surround the perforations through which the

pipes 5 pass, to permit the free passageof gas and pre vent packing of the material around the perforations.

240,436. AMMONIA SYNTHESIS. Montecatini Soc. Generale per l'Industria Mineraria ed Agricola, 35, Toro Bonaporte, Milan, Italy. Assignees of G. Fauser, 4, Via Barazzuolo, Novara, Italy. International Convention date, September 24, 1924.

The nitrogen-hydrogen mixture enters by a pipe F and passes around the tubes G of a preheater, and around the tubes of a heat interchanger H. The catalyst chamber L and the pressure-resisting outer wall A are both lined with refractory



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material R, Q, the cross section of which varies as illustrated to secure a uniform temperature in the chamber. In starting the reaction, an electric heating coil in the space I is energised, so that the gases are heated in passing over the coil to the bottom of the catalyst chamber. The temperature is controlled by a thermocouple N. The gases leaving the chamber L flow through the tubes of the heat interchanger H and preheater G to the outlet M.

LATEST NOTIFICATIONS

242,975. Process for separating solid salts of ammonium and of the alkalies or alkaline earths. Farbwerke vorm. Meister, Lucius, and Brüning. November 17, 1924.

242,990. Process for preparing calcium nitrate capable of being strewn. Farbwerke vorm. Meister, Lucius, and Brüning. November 11, 1924.

242,996. Process for transforming barium and strontium sulphates. Rothe, Dr. F., and Brenek, Dr. H. November 12, 1924.

243,026. Process for producing nitriles of the benzanthrone. Kalle and Co. Akt.-Ges. November 17, 1924.

Specifications Accepted with Date of Application

224,869. Fats, oils, and waxes, Process for splitting. J. D. Riedel Akt.-Ges. November 14, 1923.

229,306. Tar or hydrocarbon oils, Apparatus for the continuous distillation of. J. Pieters. February 12, 1924.

229,331. Gasifying solid fuel, reducing ores, and smelting metals, Process for, and apparatus therefor. L. Chavanne. February 13, 1924.

229,334. Chlorine, Manufacture of. Rhenania Verein Chemischer Fabriken Akt.-Ges. February 15, 1924.

231,159. Carbonisation of coal and other carbonaceous material. International Combustion Engineering Corporation. March 21, 1924.

234,840. Stimulating distillation, Method and means for. J. J. Deschamps. May 30, 1924.

37,574. Acetyl salicylic acid, Method of making. Ketoid Co. July 22, 1924.

242,357-8. Purifying clays and improving their colour, Processes for. W. Feldenheimer. August 7, 1924.

242,372. Gold or other precious metals, Process and apparatus for the recovery of. R. R. Came, H. C. Booth, and British Vacuum Cleaner and Engineering Co., Ltd. August 19, 1924.

242,383. Precipitating and filtering. Process of and apparatus for. L. D. Mills and T. B. Crowe. September 3, 1924.

242,388. Purifier for air or gas. C. L. Burdick. September 12, 1924.

242,393. Dyeing, printing or stenciling of celllulose acetate. British Celanese, Ltd., and G. H. Ellis. September 19, 1924. Addition to 219,349.

242,411. Distillation of fuel, Process for. A. J. A. Hereng. October 11, 1924.

242,435. Distillation of coal. J. Neath and W. Chaney. November 8, 1924.

242,444. Solid alcohol structure soaps, Process for the production of. R. Falck. November 17, 1924.

242,464. Vulcanisation of rubber. S. J. Peachey and A. Skipsey. December 9, 1924.

242,512. Manures, Manufacture of. Rhenania Verein Chemischer Fabriken Akt.-Ges., and H. Brenek. March 20, 1925.

242,521. Crotonaldehyde, Process of making. E. C. R. Marks. (*Carbide and Carbon Chemcials Corporation.*) March 31, 1925.

242,316. Oils, fats, and the like, Plant for the removal of free fatty acids and other impurities from. Lever Bros., Ltd., R. Craig, and C. E. C. Shawfield. May 9, 1924.

242,317. Mineral oil products and the like, Process of purifying. F. Schwarz. May 9, 1924.

242,336. Leucite and other complex silicates containing potassium, Process for treatment of. W. R. Ormandy and A. M. Peake. August 2, 1924.

219,301. Vessels in which solids are suspended in liquids for lixiviation, crystallisation, and the like. Aktieselskapet Krystal. July 17, 1923.

Applications for Patents

A.P.I.C.E. Soc. Anon. Prodotti Italiani Chimici Estrattivi. Extracting iodine and bromine from solutions. 29,132. November 18.

Badische Anilin- and Soda-Fabrik, and Johnson, J. Y. Manufacture of vat dyestuffs. 29,189. November 19.

Barrett Co. Coal-tar oil for flotation purposes. 29,432. November 21. (United States, November 22, 1924.)

Barrett Co. Manufacturer of rubber-compounding material. 29,433. November 21. (United States, November 22, 1924.)

Bergius, F. Process of obtaining hydrogenation gas. 28,873. November 16. (Germany, December 18, 1924.)

Bloxam, A. G., and Chemische Fabrik Griesheim-Elektron. Manufacture of ice colours. 29,229. November 19.

Bollmann, H. Apparatus for distilling fatty acids. 29,115. November 18. (Germany, February 2.)

British Enka Artificial Silk Co., Ltd. Pumps for conveying liquid. 28,974. November 17. (Germany, June 23.)

British Enka Artificial Silk Co., Ltd. Pumps for conveying liquid. 29,106. November 18. (Germany, August 11.)

British Enka Artificial Silk Co., Ltd. Manufacture of artificial silk. 29,107. November 18. (Germany, October 12.)

Caird, M. N., Grimble, F., and Steuart, D. R. Water-distilling plant for use with internal-combustion engines. 29,374. November 20.

Chemische Fabrik Griesheim-Elektron. Production of methane. 29,256. November 19. (Germany, December 3, 1924.)

Coley, H. E., and Hornsey, J. W. Method of sealing rotary kilns, etc. 29,075. November 18.

Coley, H. E., and Hornsey, J. W. Production of iron from ores. 29,076, 29,077, 29,078, 29,081. November 18.

Coley, H. E., and Hornsey, J. W. Manufacture of steel. 29,079. November 18.

Coley, H. E., and Hornsey, J. W. Manufacture of alloys. 29,080. 29,082. November 18.

Distilleries des Deux-Sèvres. Dehydration of ethylic alcohol, 29,228. November 19. (Belgium, November 20, 1924.)

Du Pont de Nemours and Co., E. I., and Marks, E. C. R. Production of benzoic acid. 28,882. November 16.

Eichengrün, A. Production of non-inflammable homogeneous solutions of organic substances. 28,988. November 17. (Germany, November 17, 1924.)

Eichengrün, A. Lacquering, etc. 28,989. November 17. (Germany, November 17, 1924.)

Eichengrün, A. Production of artificial silk, etc. 28,990. November 17. (Germany, November 20, 1924.)

Farbenfabriken vorm. F. Bayer and Co. Manufacture of colloidal organic mercury compounds soluble in water. 29,129. November 18. (Germany, November 21, 1924.)

Rinman, E. L. Production of aluminium hydrate. 29,103. November 18. (Sweden, November 22, 1924.)

Velardi, G. Extracting iodine and bromine from solutions. 29,132. November 18.

Würker, F. W. Electrolytic separation of metallic chromium. 28,872. November 16.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, November 27, 1925.

QUITE a substantial business has passed during the last week and the general outlook remains healthy. Price movements almost without exception have been in an upward direction. Export trade is quiet.

General Chemicals

ACETONE is an active market, the quotation remaining at from £80 to £82 per ton.

ACID ACETIC is in good demand. Price unchanged at £37 to £39 per ton for technical, and £39 to £41 per ton for pure, both 80% grades.

ACID FORMIC is in good demand. With the elimination of second hand parcels the spot price is improving.

ACID LACTIC is unchanged at £43 to £44 per ton for 50% by weight.

ACID OXALIC is fairly well inquired for. Price is 3¾d. per lb.

ALUMINA SULPHATE is in good demand at £5 5s. to £5 10s. per ton for the 17/18%.

AMMONIUM CHLORIDE. The demand is very slack. Quotation is nominally £19 to £20 per ton.

ARSENIC.—There is still no demand, the tendency remains in buyers' favour.

BARIUM CHLORIDE is much firmer. Spot supplies are running low, and the quotation stands at £9 to £9 10s.

BLEACHING POWDER is unchanged.

EPSOM SALTS firm and scarce at £5 10s. to £5 15s. per ton.

FORMALDEHYDE is very scarce and is quoted £43 10s. to £44 10s. per ton.

LEAD ACETATE is a little lower in price at £44 to £45 per ton for white and about the same price for brown.

LIME ACETATE remains very firm at £17 15s. to £18 per ton.

LITHOPONE is unchanged.

POTASSIUM CARBONATE is in poor demand at about £23 per ton for 90/92%.

POTASSIUM CAUSTIC is unchanged.

POTASSIUM CHLORATE.—The price appears stablised at about 4d. per lb.

POTASSIUM PERMANGANATE is unchanged at 7½d. per lb.

SODA ACETATE.—In very active demand. The price of £17 10s. per ton seems likely to advance.

SODA BICHROMATE is active. Price unchanged.

SODA HYPOSULPHITE is quiet and uninteresting.

SODA NITRITE is in good demand at £22 10s. to £22 15s. per ton.

SODA PRUSSIATE is firm at about 4¾d. per lb.

SODA SULPHIDE remains weak, and the tendency is still in buyers' favour.

ZINC SULPHATE is unchanged.

Coal Tar Products

The firm tone of the market for coal tar products is maintained.

90% BENZOL continues to be in strong demand, and prices have an upward tendency. Its value to-day is 1s. 9d. to 1s. 10d. per gallon on rails.

PURE BENZOL is worth about 2s. to 2s. 1d. per gallon on rails.

CREOSOTE OIL shows a slight improvement in price, and is quoted at 6¾d. per gallon on rails in the North, while the price in London is 7½d. per gallon.

CRESYLIC ACID is in fairly short supply. The pale quality 97/99%, shows a rise in price, and its value is about 1s. 10d. to 1s. 11d. per gallon on rails, while the dark quality 95/97% remains in the region of 1s. 5d. to 1s. 6d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. 4½d. per gallon. on rails.

HEAVY NAPHTHA is quoted at 1s. 1d. per gallon on rails.

NAPHTHALENES are unchanged, the lower grades being worth from £4 to £4 10s. per ton, the 76/78 quality about £6 per ton, and the 74/76 quality about £5 10s. per ton.

PITCH is improving and several transactions have been reported at increased figures. To-day's values are 45s. to 47s. 6d. per ton f.o.b., U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL in good request at 10s. to 12s. 6d. decline for near; spot, £37; November and December, £35 17s. 6d.; January-April, £36 2s. 6d.; May-August, £35 7s. 6d. RAPE OIL quiet. Crude crushed, spot, £48; technical refined, £51. COTTON OIL steady. Refined common edible, £45; Egyptian crude, £39; deodorised, £47. TURPENTINE easier. Spot, 74s. 3d.; December, 74s. 6d.; and January-April, 75s. 6d. per cwt.

HULL.—LINSEED OIL.—Naked, spot, £37 5s.; November and December, £37; January-April, £37 5s.; May-August, £35 7s. 6d. COTTON OIL.—Naked Bombay, crude, £34 15s.; Egyptian, crude, £36 10s.; edible, refined, £39 10s.; technical, £38 15s. PALM KERNEL OIL.—Crushed, naked, 5½ per cent., spot, £44 10s. GROUND-NUT OIL.—Crushed/extracted, £45 10s.; deodorised, £40 10s. SOYA OIL.—Extracted and crushed, £40; deodorised, £43 10s. RAPE OIL.—Extracted and crushed, £47 10s. per ton net, cash terms, ex mill. CASTOR OIL and COD OIL unchanged.

Nitrogen Products Market

Export.—During the last week the market for sulphate of ammonia has been unchanged, and prices remain firm at £12 5s. per ton f.o.b. U.K. port in single bags. For forward positions higher prices are being quoted up to the end of April. It seems clear that at present prices very little stock, if any, will be carried over into the new season.

Home.—There is very little interest in the home market for spot delivery, but many buyers are covering their requirements for January/April. The home price for December is £12 13s. per ton delivered in 4-ton lots to consumers' nearest station.

Nitrate of Soda.—The nitrate market continues very quiet. Cargoes c.i.f. chief European ports are changing hands on the basis of £11 5s. to £11 9s. per ton. For later arrivals higher prices are being quoted. There has been a good move out from dealers to consumers in the United States.

American Market Movements

(From *Drug and Chemical Markets.*)

PRACTICALLY no toluol, xylol, or solvent naphtha can be purchased outside of contracts already placed. It is expected that the market for the pure products will remain bare until the end of the year and contracts expire. Naphthalene is still firmer at recently advanced prices.

Menthol sharply lower on competition here and weakness in Japan. Quicksilver continues to advance with other fine chemicals moving well at steady prices.

That peppermint oil will go over twenty dollars to break all price records is now believed in the trade to be a certainty. Linseed oil fluctuates without any basic change. Cottonseed higher on active demand. Olive, corn, and China wood oils all show more active demand at steady prices.

Penetration of Metals by New Rays

REPORTS state that Dr. R. A. Millikan, director of the Physics Laboratory of the California Institute of Technology, claims to have traced the source of a mysterious radiation in the atmosphere to the presence of "ultra" X-Rays 100 times more penetrating than those already known. These waves, he states, which enter the highest atmosphere from the depths of outer space, are caused apparently by the disintegration or transmutation of atoms. It is said that the rays are able to penetrate 6 ft. of lead, and that their wave-length is vastly shorter than those of the gamma rays, the shortest hitherto known in physics. Sir Oliver Lodge, in an interview, stated that Dr. Millikan was a man the world respected, and said that he had no reason to be sceptical.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£20 per ton.
Acid Boric, Commercial.—Crystal, £40 per ton, Powder, £42 per ton.
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.
Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £10 10s. d/d; Contract, £8 10s. d/d, 4 ton lots.
Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
Copper Sulphate.—£25 to £25 10s. per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d.
Nickel Ammonia Sulphate.—£38 per ton d/d.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—4½d. per lb.
Potassium Chlorate.—3¾d. per lb., ex wharf, London, in cwt. kegs.
Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.
Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 30s. less for contracts.
Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£21 per ton.
Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
Sodium Bichromate.—3½d. per lb.
Sodium Bisulphite Powder 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.
Sodium Chlorate.—3d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Phosphate, £14 per ton, f.o.r. London, casks free.
Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.
Sodium Sulphide conc. solid. 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. pd.
Sodium Sulphide Crystals.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. pd.
Sodium Sulphite, Pea Crystals.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—4½d. to 4¾d. per lb. Crude 60's, 1s. 3d. to 1s. 4d. Very poor demand.
Acid Cresylic 97/99.—1s. 5d. to 1s. 7d. per gall. Pale, 95%, 1s. 7d. per gall. Dark, 1s. 5d. per gall. Good demand.
Anthracene Paste 40%.—3d. per unit per cwt.—Nominal price. No business.
Anthracene Oil, Strained.—8½d. per gall. Good inquiry. Unstrained, 8d. per gall.
Benzol.—Crude 65's.—11d. to 1s. 3d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 1s. 10½d. to 2s. 3d. per gall., ex works in tank wagons. Firm.
Toluol.—90%, 1s. 8½d. per gall. More inquiry. Pure, 1s. 10½d. to 2s. 2d. per gall.
Xylol Commercial.—1s. 10d. to 2s. 3d. per gall. Pure, 2s. 1d. to 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8½d. per gall. Market very quiet. Standard specification, 6½d. to 7¼d. per gall.; middle oil, heavy, 6½d. per gall. Market steady.
Naphtha.—Crude 9½d. per gall. Solvent 90/160, 1s. 4d. to 2s. per gall. Fair business. Solvent 90/190, 1s. 1d. to 1s. 1½d. per gall. Moderate demand.
Naphthalene Crude.—Drained Creosote Salts, £3 to £4 10s. per ton. Whizzed or hot pressed, £4 to £6. Better inquiry.
Naphthalene.—Crystals and Flaked, £9 to £10 per ton, according to districts.
Pitch.—Medium soft, 42s. 6d. to 47s. 6d. per ton, according to district. Market active; prices advanced.
Pyridine.—90/160, 19s. 6d. to 20s. per gall. Firmer. Heavy, 9s. 6d. to 10s. per gall. More inquiry.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid Amidonaphthol disulpho (1-8-2-4).—10s. 9d. per lb.
Acid Anthranilic.—7s. per lb. 100%.
Acid Benzoic.—1s. 9d. per lb.
Acid Gamma.—9s. per lb.
Acid H.—3s. 6d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
Acid Neville and Winther.—4s. 9d. per lb. 100% basis d/d.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—10d. per lb. d/d.
Aniline Oil.—7½d. per lb. naked at works.
Aniline Salts.—8d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzaldehyde.—2s. 1½d. per lb. Good home inquiry.
Benzidine Base.—3s. 6d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 29/31° C.—3d. per lb. Demand quiet.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. per lb.
Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzene.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 10d. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 2d. per lb. 100% basis d/d.
a-Naphthol.—2s. per lb. d/d. Fair home inquiry.
B-Naphthol.—11d. to 1s. per lb. d/d. Fair home inquiry.
a-Naphthylamine.—1s. 3d. per lb. d/d. Fair home inquiry.
B-Naphthylamine.—3s. 9d. per lb. d/d. Fair home inquiry.
o-Nitraniline.—5s. 9d. per lb.
m-Nitraniline.—3s. 6d. per lb. d/d.
p-Nitraniline.—1s. 11d. per lb. d/d. Fair home inquiry.
Nitrobenzene.—5d. to 5½d. per lb. naked at works. Good home inquiry.
o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.
Nitronaphthalene.—10d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. per lb. d/d.
p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—1s. 7½d. to 1s. 8d. per lb. 100% basis d/d.
o-Toluidine.—9d. per lb. Good home inquiry.
p-Toluidine.—2s. 3d. per lb. naked at works.
m-Toluylene Diamine.—4s. per lb. d/d.
m-Xylidine acetate, 2s. 11d. per lb. 100%.

Wood Distillation Products

Acetate of Lime.—Brown, £8. Quiet market. Grey, £14 10s. per ton. Liquor, 9d. per gall. 32° Tw.
Acetone.—£73 per ton.
Charcoal.—£7 to £9 per ton, according to grade and locality. Demand fair.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall, 24° Tw.
Red Liquor.—10d. to 1s. per gall. 15° Tw.
Wood Creosote.—2s. 7d. per gall. Unrefined.
Wood Naphtha, Miscible.—5s. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.
Wood Tar.—£3 15s. to £5 per ton, according to grade.
Brown Sugar of Lead.—£40 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.
Arsenic Sulphide, Yellow.—2s. per lb.
Barytes.—£3 10s. to £6 15s. per ton, according to quality.
Cadmium Sulphide.—4s. 4d. per lb.
Carbon Bisulphide.—£25 to £28 per ton, according to quantity.
Carbon Black.—5½d. per lb., ex wharf.
Carbon Tetrachloride.—£55 to £60 per ton, according to quantity, drums extra.
Chromium Oxide, Green.—1s. 3d. per lb.
Diphenylguanidine, 4s. to 4s. 3d. per lb.
Indiarubber Substitutes, White and Dark.—5¾d. to 6¼d. per lb.
Lamp Black.—£43 per ton, barrels free.
Lead Hyposulphite.—9d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£13 12s. 6d. per ton f.o.r. London.
Sulphur.—£9 to £11 per ton, according to quality.

Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£50 to £55 per ton.
Thiocarbamide.—2s. 6d. to 2s. 9d. per lb.
Thiocarbanilide.—2s. 1d. to 2s. 3d. per lb.
Vermilion, Pale or Deep.—5s. per lb.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic, 80 % B.P.—£39 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 6d. to 2s. 8d. per lb. Keen competition continuing. Good demand.
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.
Acid, Boric B.P.—Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4d. per lb., less 5%. Unsettled.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots.
Acid, Pyrogallic, Crystals.—5s. 6d. per lb. Resublimed 9s.
Acid, Salicylic.—1s. 4d. to 1s. 6d. per lb. Technical.—10½d. to 11d. per lb.
Acid, Tannic B.P.—2s. 10d. per lb.
Acid, Tartaric.—1s. 0½d. per lb., less 5%. Market firm.
Amidol.—6s. 6d. per lb., d/d.
Acetanilide.—1s. 7d. to 1s. 8d. per lb. for quantities.
Amidopyrin.—12s. 6d. per lb.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—11s. per oz. for English make.
Barbitone.—10s. per lb.
Benzonaphthol.—3s. 3d. per lb. spot.
Bismuth Carbonate.—12s. 9d. to 14s. 9d. per lb.
Bismuth Citrate.—11s. 4d. to 13s. 4d. per lb.
Bismuth Salicylate.—10s. 2d. to 12s. 2d. per lb.
Bismuth Subnitrate.—10s. 9d. to 12s. 9d. per lb. according to quantity.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 9d. to 1s. 11d. per lb.; sodium, 2s. to 2s. 2d. per lb.; ammonium, 2s. 3d. to 2s. 5d. per lb., all spot. Prices reduced.
Calcium Lactate.—1s. 4½d. to 1s. 6d. Market firmer. B.P. 1s. 8d. to 2s., according to quantity.
Chloral Hydrate.—3s. 5d. to 3s. 6d. per lb., duty paid.
Chloroform.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
Creosote Carbonate.—6s. per lb.
Formaldehyde.—£41 per ton, in barrels ex wharf.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
Guaiacol Carbonate.—6s. to 6s. 6d. per lb.
Hexamine.—2s. 4d. to 2s. 6d. per lb.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.
Hydroquinone.—4s. 4½d. per lb., in cwt. lots.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 10d. to 2s. 1d. per lb. Green, 2s. 2d. to 2s. 7d. per lb. U.S.P., 1s. 9d. to 2s. per lb. Prices advanced.
Magnesium Carbonate.—Light Commercial, £33 per ton net.
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £23 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 45s. net per lb., December delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make. Very heavy demand.
Mercurials.—Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. to 4s. 2d. per lb. Market firmer.
Methyl Salicylate.—1s. 8d. per lb. Demand increasing, price firmer.
Methyl Sulphonal.—16s. 9d. per lb.
Metol.—9s. per lb. British make.
Paraformaldehyde.—1s. 11d. for 100% powder.
Paraldehyde.—1s. 2d. to 1s. 6d. per lb., according to quantity.
Phenacetin.—4s. to 4s. 3d. per lb.
Phenazone.—6s. to 6s. 3d. per lb. Spot lower than forward price.
Phenolphthalein.—4s. to 4s. 3d. per lb. Supply exceeds demand.
Potassium Bitartrate 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots. Market very firm.
Potassium Citrate.—1s. 9d. to 2s. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. in cwt. lots. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot. Slightly easier.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—3s. 9d. per lb. In fair quantities.
Saccharin.—51s. 5d. to 53s. 8d. per lb., according to quantity. Limited inquiry.
Salol.—3s. per lb.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.
Sodium Citrate, B.P.C., 1911.—1s. 6d. to 1s. 9d. per lb., B.P.C., 1923. 1s. 9d. to 2s. per lb., according to quantity. Advanced.
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 80s. per cwt., according to quantity.
Sodium Salicylate.—Powder, 2s. to 2s. 1d. per lb. Crystal, 2s. 1d. to 2s. 2d. per lb. Flake, 2s. 3d. to 2s. 4d. per lb. Very heavy demand.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.
Sulphonal.—12s. per lb. Limited demand.
Thymol.—12s. to 15s. per lb.

Perfumery Chemicals

Acetophenone.—9s. per lb.
Aubepine (ex Anethol).—10s. 3d. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. per lb.
Anethol (M.P. 21/22° C.).—6s. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 4d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 4d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—2s. 9d. per lb.
Cinnamic Aldehyde Natural.—16s. 9d. per lb.
Coumarin.—11s. 9d. per lb.
Citronellol.—16s. per lb.
Citral.—9s. 6d. per lb.
Ethyl Cinnamate.—9s. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. per lb.
Geraniol (Palmarosa).—22s. 6d. per lb.
Geraniol.—8s. to 16s. per lb.
Heliotropine.—6s. 3d. per lb.
Iso Eugenol.—14s. 6d. per lb.
Linalol ex Bois de Rose.—18s. per lb.
Linalyl Acetate.—18s. per lb.
Methyl Anthranilate.—9s. 3d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ketone.—40s. 6d. per lb.
Musk Xylol.—5s. 9d. per lb.
Nerolin.—4s. per lb.
Phenyl Ethyl Acetate.—14s. per lb.
Phenyl Ethyl Alcohol.—11s. 6d. per lb.
Rhodinol.—36s. 6d. per lb.
Safrol.—1s. 4d. per lb.
Terpineol.—1s. 8d. per lb.
Vanillin.—21s. 6d. to 23s. 6d. per lb. Good demand.

Essential Oils

Almond Oil.—12s. 6d. per lb.
Anise Oil.—3s. 9d. per lb.
Bergamot Oil.—26s. per lb.
Bourbon Geranium Oil.—14s. per lb.
Camphor Oil.—60s. per cwt.
Cananga Oil, Java.—11s. 3d. per lb.
Cinnamon Oil, Leaf.—5d. per oz.
Cassia Oil, 80/85%.—11s. per lb.
Citronella Oil.—Java, 85/90%, 3s. 7d. Business for 1926 supplies at higher prices. Ceylon, 2s. 4d. per lb.
Clove Oil.—7s. 3d. per lb.
Eucalyptus Oil, 70/75%.—1s. 10d. per lb.
Lavender Oil.—French 38/40% Esters, 28s. per lb.
Lemon Oil.—7s. 6d. per lb.
Lemongrass Oil.—4s. 9d. per lb.
Orange Oil, Sweet.—11s. 3d. per lb.
Otto of Rose Oil.—Bulgarian, 60s. per oz. Anatolian, 35s. per oz.
Palma Rosa Oil.—13s. 6d. per lb.
Peppermint Oil.—Wayne County, 124s.; Japanese, 28s. 9d. per lb. Market excited. Price still rising.
Petitgrain Oil.—9d. per lb.
Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, November 27, 1925.

IN the heavy chemical market the better tone which has been evident for the past week or two still holds good. Export inquiries have been numerous and quantities asked for larger than for some little time.

Prices, where there are any changes, show an upward tendency, with the exception of arsenic, which is still very flat.

Industrial Chemicals

ACID ACETIC 98/100%.—In usual steady demand. Quoted £55 to £67 per ton according to quality and packing, c.i.f. U.K. port; 80% pure, £40 to £41 per ton; 80% technical, £38 to £39 per ton, packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flaked, £40 per ton; powdered, £42 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Unchanged at about 4½d. per lb. delivered, or f.o.b. U.K. port.

ACID CITRIC, B.P. CRYSTALS.—Rather easier at about 1s. 3⅞d. per lb., less 5%, ex wharf. In very moderate demand.

ACID FORMIC 85%.—Quoted £46 per ton, ex wharf. Prompt shipment from the continent.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC 98/100%.—Usual steady demand, and price for spot material unchanged at about 3¾d. per lb., ex store. Offered from the continent at about 3⅝d. per lb., ex wharf, prompt shipment.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Steady demand, and price unchanged at about 11½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE 17/18%, IRON FREE.—On offer from the continent at about £5 10s. per ton, c.i.f. U.K. ports. Spot material available at £6 5s. per ton, ex store.

ALUM, LUMP POTASH.—Quoted £7 15s. per ton, c.i.f. U.K. ports. Spot material available at about £9 2s. 6d. per ton, ex store. Powdered quality offered from the continent at £7 12s. 6d. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—In moderate demand and price unchanged at 1s. 4½d. per lb., less 5%, ex station. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K. ports.

AMMONIA LIQUID 880°.—In usual steady demand and price unchanged at 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £27 to £27 10s. per ton, ex station. Offered from the continent at about £23 10s. per ton, c.i.f. U.K. ports. Fine white crystals quoted £19 5s. per ton, c.i.f. U.K. ports, prompt shipment.

ARSENIC, REFINED WHITE CORNISH.—Price still further reduced. Works now offering at about £17 10s. per ton, ex wharf, early delivery. Spot material quoted £20 per ton, ex store.

BARIUM CHLORIDE.—Large white crystals quoted £9 per ton, ex store, spot delivery. On offer from the continent at about £7 15s. per ton, c.i.f. U.K. ports. Fine white crystals £7 5s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—English material unchanged at £9 10s. per ton, ex station; contracts 20s. per ton less. On offer from the continent at about £7 15s. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental unchanged at about £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—In good demand for export. Price unchanged at about £3 7s. 6d. per ton, f.o.b. U.K. ports, packed in casks.

COPPER SULPHATE.—In moderate demand for export. Quoted £23 10s. per ton, f.o.b. U.K. ports. Continental on offer at about £22 15s. per ton, ex wharf.

FORMALDEHYDE 40%.—Offered from the continent at about £39 10s. per ton, c.i.f. U.K. ports. Spot material available at £41 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material rather cheaper, at about £43 10s. per ton, ex store.

LEAD, WHITE.—On offer from the continent at about £43 per ton, ex wharf. Spot material quoted £44 per ton, ex store.

LEAD ACETATE.—White crystals offered from the continent at about £43 5s. per ton c.i.f. U.K. ports. Spot material quoted £45 5s. per ton, ex store.

MAGNESITE, GROUND CALCINED.—In moderate demand and price unchanged at about £8 15s. per ton, ex station.

POTASH CAUSTIC, 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton, c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE 96/98%.—Quoted £25 15s. per ton, c.i.f. U.K. ports. Prompt shipment from the continent. Spot material available at about £26 15s. per ton, ex store.

POTASSIUM CHLORATE 98/100%.—Limited quantities available for shipment from the continent at about £30 per ton, c.i.f. U.K. port, powdered quality.

POTASSIUM NITRATE, SALTPETRE.—99% refined granulated quoted £24 15s. per ton c.i.f. U.K. ports. Spot material available at about £27 5s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at 7½d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—In good demand and price unchanged at about 7¾d. per lb., ex store. Offered for prompt shipment from the continent at about 7½d. per lb., ex wharf.

SODA CAUSTIC.—76/77% £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £16 12s. 6d. per ton; powdered, 98/99%, £20 17s. 6d. per ton—all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—On offer at about £18 5s. per ton, ex store, spot delivery. Quoted £17 15s. per ton c.i.f. U.K. ports, prompt shipment.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb. delivered.

SODIUM CARBONATE, SODA CRYSTALS.—£5 to £5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture unchanged at £9 10s. per ton, ex station, minimum ton lots. Pea crystals £14 per ton, ex station. Continental commercial quality quoted £9 5s. per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store. 95/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton, ex store. Offered from the continent about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Still in good demand and price for spot material now about 4¼d. per lb., ex store. On offer from the continent at 4¼d. per lb., ex wharf.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English material—Solid 60/62% now £13 per ton; broken, £14 per ton; flake, £15 per ton; crystal, 31/35%, £8 10s. per ton. Carriage paid U.K. stations, minimum four ton lots, with slight reductions for contracts to the end of the year. 60/62% solid offered from the continent at £10 15s. per ton c.i.f. U.K. ports; broken £1 per ton more. 30/32% crystals, £7 15s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £10 10s.; roll, £9 10s.; rock, £9 7s. 6d.; ground, £9 5s.—per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material, 96/98%, quoted about £24 per ton f.o.b. U.K. ports. 98/100% solid on offer from the continent at about £22 10s. per ton, c.i.f. U.K. ports. Powdered about 20s. per ton extra.

ZINC SULPHATE.—Of continental manufacture on offer at about £11 15s. per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

DIETHYLANILINE.—3s. 9d. per lb. Some home inquiries.

ORTHO NITROTOLUOL.—5½d. per lb. Some home and export inquiries.

METANITRANILINE.—3s. 6d. to 3s. 9d. Small home inquiries.

SULPHANILIC ACID.—9d. per lb. Fair home inquiries.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, November 27, 1925.

The tone of the chemical market this week in Manchester has continued to be rather more cheerful and a fair amount of business has been done in the staple lines, forward commitments coming in for a share of the attention from buyers. The demand for chemicals for use in the cotton textile industries has not been conspicuous by any great expansion as had been anticipated. Values generally are maintaining recent levels pretty well all round, the only alterations since last report being slight shadings in one or two instances.

Heavy Chemicals

Saltcake is selling slowly and prices are easy, current quotations ranging from £3 10s. to £3 12s. 6d. per ton. Glauber salts are coming in for scanty attention and in this case values are lower at round £3 5s. per ton. Chlorate of soda is still on offer at 2¾d. per lb. and a fair inquiry is being met with. Soda crystals are pretty active and prices are steady at £5 5s. per ton. Sodium sulphide is about unchanged at £11 15s. per ton for 60-65 per cent. concentrated and round £9 10s. for commercial, with business moderate. Caustic soda is firm and in steady request at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76-77 per cent. Bicarbonate of soda is still quoted at £10 10s. per ton and a fair amount of business is being put through. Alkali is maintained at round £6 15s. per ton and meets with a quietly steady demand. Inquiry for prussiate of soda is only moderate though prices continue round 4d. per lb. Hyposulphite of soda is rather quiet at about £9 per ton for commercial quality and £14 to £14 5s. per ton for photographic crystals. Bichromate of soda is selling slowly at 3½d. per lb. Bleaching powder is still quoted at about £9 per ton, the demand for this material being on a fair scale. Phosphate of soda is still quiet though unchanged from last week at £12 5s. to £12 10s. per ton. Acetate of soda is rather inactive at round £17 10s. per ton.

Among potash products caustic is arousing only limited interest and prices continue easy at £27 to £27 10s. per ton for 90 per cent. strength. Carbonate of potash meets with a moderate amount of inquiry at £25 10s. to £26 per ton. The demand for bichromate of potash is not too active and values are easy though quotably unchanged at 4½d. per lb. Chlorate of potash is steady and in moderate request at round 4d. per lb. Yellow prussiate of potash is quiet at about 7½d. per lb. Permanganate of potash is in small demand and values are on the easy side; B.P. quality is on offer at about 7½d. per lb. and commercial at 5¾d. to 6d.

The demand for sulphate of copper is on a limited scale though prices are steady at £24 to £24 10s. per ton. Arsenic keeps quiet and quotations are weak in consequence; white powdered, Cornish makes, is offering at round £15 per ton at mines. Epsom salts are about maintained at last week's level of £3 15s. per ton, but business is rather dull. Magnesium sulphate, pharmaceutical quality, is quoted at £4 10s. to £4 15s. per ton. Acetate of lime is well held at £15 to £15 10s. per ton for grey material and round £8 for brown, a fair demand being experienced. Acetate of lead is being called for in moderate quantitites; prices are firm at £44 to £45 per ton for white and about £40 for brown. Nitrate of lead keeps steady at £40 to £41 per ton.

Acid and Coal Tar Products

Oxalic acid is steadier at 3¾d. per lb. though buying interest is not particularly pronounced. Acetic acid is in quiet demand and values are maintained at £38 per ton for 80 per cent. commercial and £66 to £67 per ton for glacial. Tartaric acid is unchanged in position or value at 11½d. per lb. Citric acid is still slow though fairly steady at 1s. 3½d. per lb.

Pitch has been a little more active at 40s. per ton or slightly above this figure. Creosote oil is steady and meets with a fair amount of inquiry at about 6d. per gallon. Carbolic acid is quiet but unchanged from its recent level at 4¼d. per lb. for crystals and 1s. 3d. to 1s. 4d. per gallon for crude material. Solvent naphtha is in limited request at 1s. 5½d. per gallon. Crude naphthalene is steady and in moderate demand at £4 per ton and upwards, with refined still offering at £12 to £13 er ton.

Institute of Chemistry

Annual Meeting of the London Section

The annual general meeting of the London and South-Eastern Section of the Institute of Chemistry was held on Wednesday, November 18, when Sir Robert Robertson occupied the chair. Mr. Arthur J. Chapman, the Honorary Treasurer, submitted the financial statement for the past twelve months, which was received and adopted. He stated that under the new arrangements he would appear to have very little to do except to sign an occasional cheque. Mr. Barrs asked what the Committee proposed to do with the balance in hand, and the treasurer stated that it was felt necessary to retain it in order to meet the less official obligations of the Section and also against the possibility that the present arrangements for the financing of Local Sections might not be permanent.

The Honorary Auditors, Messrs. Harmsworth and Lush, were re-elected.

The Officers and Committee were elected as reported in The Chemical Age last week. Mr. G. S. W. Marlow was re-elected honorary secretary.

The Chairman reported briefly upon the work of the Committee, referring in particular to the steps which had been taken towards co-ordinating the various chemical activities in London. He referred to the meeting of an informal committee of the Secretaries of the chemical bodies which had formulated a joint meeting card and had succeeded in avoiding the overlapping of meetings and in providing joint meetings between the various bodies. From their labours some statistics had been obtained as to the numbers of members common to two or more societies. Although the figures for the Chemical Society could not be included in these statistics, he felt that one fact stood out, namely, that out of nearly 1,750 members of the Institute Local Section only 628 belonged to one or more of the scientific societies. Of these only 403 belonged to the Society of Chemical Industry. He felt that this was a deplorable state of affairs. The argument that the Journals of these Societies could be seen in the laboratory was no adequate excuse. The valuable information contained in these Journals could not be studied in the few spare moments thus afforded. He felt that the excuse that chemists were unable to afford the subscriptions of the Societies was also too flimsy. He appealed to members of the Institute to pull their weight.

On the conclusion of the official business refreshments were served, after which an enjoyable smoking concert was held, the artistes being:—Mrs. Boseley and the Misses Maconochie and Macdonaugh, and Messrs. Paget and Taylor. Mr. Boseley shared with Mr. Kipps the duties of accompanist. The whole meeting, led by Sir Robert Robertson and Mr. Marlow, joined in singing a number of choruses and sea shanties.

Mixing and Grinding Machinery

A wide range of plant is utilised in grinding, mixing, and refining processes in chemical industry. With the object of giving a continuous operation of mixing and refining without any interruption of work, Pelkman Bros., Ltd., of 3, Milk Street Buildings, London, E.C.2, have produced a combined machine. The mixing section works the ingredients into a heavy paste in short time, and the mixing then passes direct into the hopper of the refining machine without manual assistance, thus saving much time and supervision. Special double-arm mixing machines for very stiff mixings, and a wide range of kneading and refining plant are also described and illustrated in their catalogue. The machines have been found to be particularly adapted to the requirements of the paint, artificial manure, soap, and allied industries.

Electric Industrial Ovens

To users of drying and other ovens, the advantages of electrical heating are obvious, thus ensuring uniform temperature, the absence of fumes and simple temperature control. Wild-Barfield electric ovens, illustrated in a new booklet just published by Automatic and Electric Furnaces, Ltd., of 173–5, Farringdon Road, London, E.C., can be fitted with a special thermostat which automatically controls the temperature and thus effects considerable economies. A special feature of these ovens is that all electrical contacts are made outside the oven so that there is no danger if the oven charge gives off an inflammable gas.

Company News

PARKES CHEMISTS, LTD.—The directors announce the payment on November 30 of an interim dividend of 2½ per cent., less tax, on the ordinary shares for the half-year ended August 31.

NIGERIAN BASE METALS CORPORATION, LTD.—A meeting is to be held in London to-day (Saturday) to consider an increase of capital from £350,000 in 1,400,000 shares of 5s. each to £600,000 by the creation of 1,000,000 further shares of 5s. each.

CLEVELAND SALT CO.—For the year ended September 30 last the accounts show a net available sum of £6,178, including £1,787 brought in. A dividend of 15 per cent. and a bonus of 5 per cent. are proposed on both the preference and deferred shares, leaving £2,578 to be carried forward.

SANTIAGO NITRATE CO.—The report for the year ended June 30 last states that there was a gross profit of £21,662. The net profit is £10,306, which, added to £10,616 previously standing to the credit of profit and loss account, makes a total of £20,922. It is now proposed to pay a dividend of 7½ per cent., less tax, and to carry forward £8,922.

BRITISH COTTON AND WOOL DYERS' ASSOCIATION.—The net profits for the half-year ended September 30 last, including income from investments, after making charges of £67,462, amount to £41,244. The amount brought forward at March 31 last (after deducting £5,250 voted at shareholders' meeting) was £38,037, giving a credit balance on profit and loss account of £79,281.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

SOAP MAKING MATERIALS.—A firm of commission agents is desirous of obtaining agencies for Danzig and Poland of British firms exporting Shellac, tallow, soya oil, etc., tallow, soya oil, etc., refined, hankow wood oil, and turpentine. (Reference No. 608.)

PAINTS, OILS, CEMENT.—Tenders are invited for the supply of paints, oils, and cement for Belfast Water Commissioners, to be sent to Mr. W. I. Quinn, Water Office, Belfast, by December 9.

TAR AND ROAD MATERIALS.—Tenders are invited for the supply of tar and other road-surfacing proprietary articles, also best Portland cement, for Bexley U.D.C. Forms from Mr. W. T. Howse, surveyor, Bexley Heath, to be returned by January 2.

Society of Dyers and Colourists

AT a meeting of the Manchester Section of Dyers and Colourists, held on Friday, November 20, Part I of a paper on "The Behaviour of Different Starches towards Dyestuffs and Iodine," by J. Huebner and K. Venkataraman, was read. The different starches have been used extensively in conjunction with dyestuffs, and, although it is known that they are capable of absorbing dyestuffs, no quantitative study of the behaviour of different starches towards dyestuffs has so far been made. Maize, potato, rice, sago, tapioca, and wheat starch were used in the investigation.

The authors found that all the starches absorb larger amounts of basic dyestuffs than of acid and substantive dyestuffs. As a rule rice starch takes up the largest and sago the smallest amount of dyestuff. It was also found that the depth of shade of the dyed starches did not always directly correspond to the actual amount of dyestuff absorbed. Suida stated that starch free from albumen would not absorb acid dyestuffs. It was, however, found that tapioca starch, which contains no albumen, does absorb more indigo-carmine than does rice starch which does contain albumen. Gelatinised starches, with the exception of sago starch, absorb less dyestuff than the original starches from which they have been prepared. The ordinary law of adsorption, which indicates that the amount of absorption is proportional to the adsorbing surface, may afford an explanation for the marked difference in the amounts of dyestuff absorbed by the different starches. The absorption of inorganic salts and of tannic acid by starches has also been studied, as well as the behaviour of different dyestuffs towards insulin.

Chemical Company's Shares Case

Alleged False Statements in Prospectus

MR. JUSTICE TOMLIN in the Chancery Division on Thursday had before him an action by Mr. William Guy-Pell of Hyde Park Place, W., claiming from Mr. Joseph Day, of St. Margarets-on-Thames, damages for alleged fraudulent misrepresentation in connection with the purchase of shares in the Catalytic Chemical Co., Ltd.

Mr. Spens, for the plaintiff, said that he claimed alternatively for compensation against defendant as director of the company in respect of alleged untrue statements.

In September 1921, Mr. Day met Mr. Guy-Pell and invited him to invest in the Catalytic Chemical Co., Ltd., and Mr. Guy-Pell bought 1,000 £1 preference shares and 1,250 sixpenny ordinary shares. The representations in the prospectus that were complained of induced these statements:—

The principal plant was erected for the manufacture of salicylic acid which is now unremunerative; practically without alteration it can at once commence making caramel at the rate of 6 tons per day. The raw material costs about £31 per ton and each ton produces about 1¼ tons of caramel at about £62 per ton, leaving a profit of about £30 a ton. Butyric acid can be made, for which a complete plant exists at the works with a capacity of 1½ tons per month—cost of manufacture about 2s. per lb., sells at about 5s. 3d. per lb. Another plant can make about 2 cwts. a day of pyrogallic acid, which sells at about 10s. per lb. and costs under 4s. a lb. to manufacture. The butyric acid plant is producing about £60 worth weekly. This is the only butyric acid plant in this country and during the last 11 days orders have been received for £1,025 worth of this article, the gross profit on which amounts to over £600. Plant for the manufacture of lactic acid and calcium lactate starts working in a few days. Contracts have been entered into, one for 24 tons of the former, and one for one ton of the latter per week, and the profits amount to over 100 per cent. in each case. Arrangements have been made for the manufacture of five other chemicals, all equally profitable.

Mr. Spens said that his case was that these statements were untrue in the following details: the caramel produced was practically unsaleable; no butyric or pyrogallic acid could be made at the profit stated, and no attempt to produce pyrogallic acid was made; attempts to make butyric acid resulted in a loss; lactic acid and calcium lactate were never made, and there were no arrangements to produce the five other chemicals. The company's shares were valueless. The business was started in November, 1907, by a company called W. Everitt, Ltd., which went into voluntary liquidation in October, 1911. In the following October W. Everitt and Co., Ltd., was incorporated, and in April, 1919, the company passed a resolution to wind-up. In September, 1919, a third company, Walter Everitt, Ltd., was formed to take over the business. A receiver of this company was appointed and a compulsory winding-up order was made in April, 1921. The assets were bought by the National Industrial Development Co., Ltd., which sold them to the Catalytic Chemical Co., Ltd.

Mr. Guy-Pell, in evidence, said he was told that Sir Robert McAlpine and Co. were taking up the balance of the shares in the company, but this was untrue. Mr. Day did not tell him in September, 1921, that Dr. Walkey claimed to have discovered 25 to 30 per cent. of phosphate of lime and the same proportion of aniline in the spent shale and shale oil belonging to English Oilfield, Ltd., and that he was forming the Catalytic Chemical Co. to work the processes. He denied that he visited the factory at Southall before applying for shares, that only one sheet of the document called a prospectus was handed to him originally, that Dr. Walkey handed it to him at the works, or that it was handed to him after he had applied for shares.

After further evidence the case was adjourned until Wednesday next.

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THESE VESSELS set up Vertically one above the other and are thoroughly Water Cooled.

Economies of Floor Space and Efficiency of Operation are secured. There are no submerged joints.

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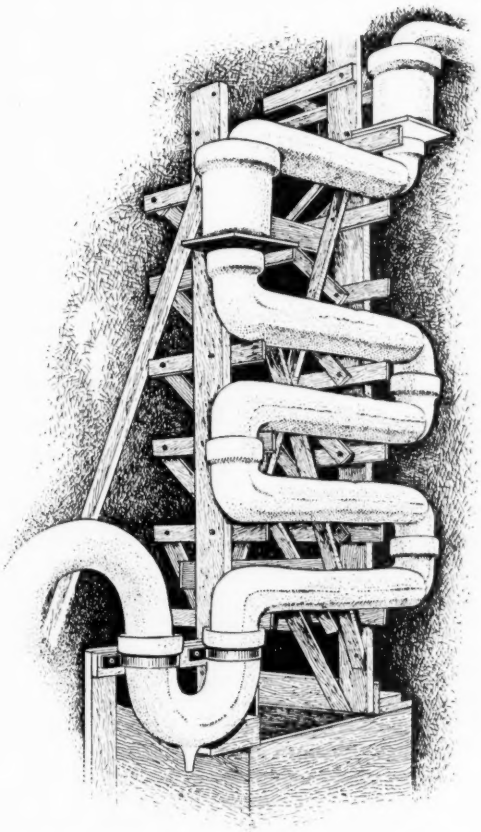

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Telephone Nos. 42 & 43 Wallsend. Telegrams: "Thermal, Wallsend."

ABC Code, 5th and 6th Editions, and Bentley's used.

Latest Government Contracts

RECENT Government contracts in the various departments include :—

Admiralty

CIVIL ENGINEER-IN-CHIEF'S DEPARTMENT.—Portland Cement: Casebourne and Co., Ltd., Haverton Hill, near Middlesbrough; T. Beynon and Co., Ltd., London, E.C.

CONTRACT AND PURCHASE DEPARTMENT.—Cylinders, Oxygen: The Chesterfield Tube Co., Ltd., Chesterfield. Oil, Compound: Silvertown Lubricants, Ltd., London, E.; W. B. Dick and Co., Ltd., London, S.W. Oil, Heavy Filtered, Mineral: Anglo-American Oil Co., Ltd., London, S.W. Oil, Special Mineral Lubricating: Silvertown Lubricants, Ltd., London, E.; Ragosine and Co., London, E.; Oil Services, Ltd., London, E.C. Petroleum Jelly: Silvertown Lubricants, Ltd., London, E.

War Office

Air Coolers: Caird and Rayner, London, E. Barrels, Chemical: Dunbars, Cooperage, Ltd., London, E. Drums, Oil: P. D. Mitchell, Ltd., Dundee. Ebonite: Hightensite and Ebonite Manufacturing Co., Ltd., London, E. Linseed Oil, Raw and Boiled: Younghusband, Barnes and Co., London, S.E. Magnesium Powder: Magnesium Co., Ltd., London, S.E. Nickel: Mond Nickel Co., Ltd., Clydach, near Swansea. Paint, Prepared: Alexander Ferguson and Co., Ltd., Glasgow; N. J. Fenner and H. B. Alder and Co., Ltd., London, E.C.; Foster, Mason and Harvey, Ltd., London, S.E.; Locke, Lancaster and W. W. and R. Johnson and Sons, Ltd., London, E.C.; Naylor Bros. (London), Ltd., Slough. Soda, crystals, Caustic and Ash: Brunner, Mond and Co., Ltd., London, E., and/or Winnington. Sulfarsenal: Wilcox, Jozeau and Co., London.

Air Ministry

Butyl Alcohol: Synthetic Products Co., Ltd., London, E.C. Butyl Alcohol, Conversion to Methyl Ethyl Ketone: Synthetic Products Co., Ltd., London, E.C. Fluid, Disinfectant: Jeyes Sanitary Compounds, Ltd., London, E.C. Oil, Castor: Hull Oil Manufacturing Co., Ltd., Hull; Premier Oil Extracting Mills, Ltd., Hull.

Crown Agents for the Colonies

Cement: The Cement Marketing Co., London, S.W.; T. Beynon and Co., Ltd., London, E.C. Chemicals: Howards and Sons, Ltd., Ilford, London; May and Baker, Ltd., London, S.W.; Southall Bros. and Barclay, Ltd., Birmingham. Disinfectant: H. Edward Hope and Co., Ltd., London, W. Lead, Pig: Grey and Marten, Ltd., London, S.E. Machines, Concrete Block Making: Winget (1924), Ltd., London, S.W. Neosalvarsan: A. C. Henry, London, E.C. Oil: J. Light and Son, Liverpool; Vacuum Oil Co., Ltd., London, S.W.; Valvoline Oil Co., Liverpool. Oil of Terebinth: J. Arnot and Son, Ltd., Newcastle-on-Tyne. Paint: Locke Lancaster and W. R. Johnson, London, E.C.; Torbay Paint Co., London, E.C.

H.M. Prison Commission

Gas Mantles: Plaisetty Manufacturing Co., London, E. Soap, Hard Yellow and Carbolic: C. H. Parsons and Bros., Ltd., Leeds.

Phosphorus in Agriculture

PHOSPHORUS in agriculture was the subject of a paper read by Dr. E. Vanstone, F.I.C., head of the Chemical Department of the Seale-Hayne College, Newton Abbot, to a joint meeting of the Bristol Section of the Society of Chemical Industry and the Institute of Chemistry at Bristol last week. Dr. Vanstone said that plants required phosphorus for active growth and animals needed it for bodily development. Phosphorus in the soil varied in quantity according to the country, and in England phosphates had increased meat and milk production, increased hay crops, and added nitrogen to the soil. It was important to know the rates at which phosphatic fertilisers would give up their phosphorus. Plants could take up most phosphorus from those basic slags which were most soluble in citric acid solution, but this was not the case with mineral phosphates, and for these the test was useless. A satisfactory test was obtained by using oxalic acid, and the rate at which phosphates dissolved in this acid was also the rate at which plants took up the phosphorus.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

HORSFORTH DYEING AND FINISHING CO., LTD. (late Howarth Wild and Harrison, Ltd.). (M., 28/11/25.) Registered November 13, £500 further charge, to Mrs. A. H. Clarkson, Edenpark, Lenzie; charged on hereditaments at Hawksworth Road, Horsforth, also general charge. *£2,500, December 31, 1924.

Receivership

SHANKLAND (G. A.), LTD. (R., 28/11/25.) R. E. Clark, of Hanley, Stoke-on-Trent, C.A., was appointed receiver on November 13, 1925, under powers contained in debenture date July 11, 1923.

London Gazette, &c.

Company Winding Up Voluntarily

CRESOLS AND GENERAL ANTISEPTICS CO., LTD. (C.W.U.V., 28/11/25.) F. H. Harper, 27, Chancery Lane, London, W.C.2, Incorporated Accountant, appointed liquidator, November 14.

Notice of Intended Dividend

BOWEN, Evan Morgan, of Penhydd, Blundell Avenue, Porthcawl, Glamorgan, chemical engineer. Last day for receiving proofs, December 5. Trustee, E. Owen, 34, Park Place, Cardiff, Official Receiver.

New Companies Registered

CANCELA, LTD., 8, Crosby Square, London, E.C.3. To acquire any invention or process, and to work, perfect, turn to account or dispose of the same, and in particular inventions or processes relating to the manufacture and use of cellulose, acetate and allied chemical products, etc. Nominal capital, £40,000 in £1 shares.

BULMER RAYON CO., LTD., The Silk Works, Stowmarket, Suffolk. Manufacturers and producers of artificial silk and other products and substances derived from wood or cotton pulp and other vegetable material as viscose or collodion. Nominal capital, £600,000 in 509,000 8 per cent. cumulative preference shares of £1 and 2,000,000 deferred shares of 1s.

SAM WALLACE AND CO., LTD., wholesale and retail dealers in oil; oil refiners, manufacturers and producers of oil, gas, and liquid fuel, etc. Nominal capital, £1,205 in 1,200 6 per cent. cumulative preference shares of £1 and 100 ordinary shares of 1s. each. Solicitors: Grundy, Kershaw, Sampson and Co., 6, Austin Friars, London, E.C.2.

New Concrete Material

A NEW kind of concrete, which in its texture resembles cork, will be used in the construction of the new Devonshire House, Piccadilly, for enclosing the steel stanchions of the building. The material is known as aerated concrete, and will be formed of ferrocrete, rapid-hardening cement and coal slag mixed with certain chemicals and water. The chemicals in contact with the water give off hydrogen and cause the concrete "mix" to swell. It sets full of small and evenly distributed cavities which make up 70 per cent. of its bulk. Aerated concrete possesses remarkable insulating qualities because of its cellular nature and it can be worked by ordinary wood-working tools.